EXHIBIT G

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March 29, 2024

Robert M. Jackson
Executive Vice President, General Counsel and Secretary
CyrusOne
2850 N Harwood St., Suite 2200
Dallas, Texas 75201

Re: Notice of Infringement of Valtrus Innovations Ltd.'s Patents

Dear Mr. Jackson:

My law firm represents Valtrus Innovations Limited ("Valtrus") in various patent matters, including several ongoing patent litigations.

Valtrus is the owner of an extensive portfolio of patents originating from Hewlett Packard Enterprise Company (and/or various related or predecessor companies). Valtrus' portfolio includes nearly 2,000 patents that cover a wide range of products and technologies relating to data centers, cloud computing, server technology, communication devices, and many more. Included in the portfolio are over ninety patents directly related to important technologies implemented in data centers, such as cooling systems and solutions. A representative list of data center-related patents is attached to this letter as Exhibit A. Further details regarding Valtrus may be found on its website at www.valtrusinnovations.ie.

Valtrus has identified numerous data center technologies and systems that infringe one or more patents owned by Valtrus. To this end, Valtrus has initiated patent litigation against Digital Realty Trust and Evoque in the United States District Court for the Eastern District of Texas. The case numbers are 2-24-cv-00139 and 2-24-cv-00142; each involves six patents relating to various data center technologies.

After thorough investigation, Valtrus has identified the following patents practiced by CyrusOne and for which CyrusOne may require a license and/or release:

- U.S. Patent No. 6,862,179 entitled Partition for Varying the Supply of Cooling Fluid
- U.S. Patent No. 6,718,277 entitled Atmospheric Control within a Building
- U.S. Patent No. 6,854,287 entitled Cooling System
- U.S. Patent No. 7,339,490 entitled Modular Sensor Assembly
- U.S. Patent No. 7,031,870 entitled Data Center Evaluation Using an Air Re-Circulation Index
- U.S. Patent No. 9,310,855 entitled Flexible Data Center and Methods for Deployment
- U.S. Patent No. 7,939,967 entitled Multiple Power Supply Control

This list is preliminary, and our analysis is ongoing. We expect that we will identify additional patents that are practiced by CyrusOne in due course. From this list we have also prepared several exemplary claim charts using publicly available sources, attached as Exhibit B, which provide more detail about how we believe that CyrusOne infringes the identified patents.

Valtrus hereby offers CyrusOne the opportunity to license any or all of the Valtrus patents. If CyrusOne is interested in concluding such a license, Valtrus would like to arrange a meeting (either in person or virtual) during the week of April 22, 2024, with appropriate representatives of both companies to discuss this matter in greater detail. At that time, we would hope to reach an agreement with you on an overall process and timeline for concluding such a license. We would also be prepared to explain in greater detail the claim charts we are providing and to hear any response you may have regarding the same.

Valtrus fully understands that with respect to certain technologies, Valtrus has incomplete knowledge regarding the products, systems and solutions implemented by CyrusOne in its data centers, as CyrusOne data centers are secure facilities that are not open to the public. Thus, we suggest, as part of the overall process, the parties enter into a non-disclosure agreement that would provide Valtrus and/or its representatives access to CyrusOne confidential documentation (including data center access) so Valtrus can, in good faith, confirm the scope and extent of CyrusOne's infringement.

Please let us know as soon as possible, but no later than April 15, whether CyrusOne is agreeable to the aforementioned meeting. If we do not hear from you by that time, we will assume that CyrusOne is not interested in a license from Valtrus. Valtrus of course reserves all rights.

I look forward to hearing from you.

Sincerely,

Matthew Berkowitz

Enclosure

Copy to:

Angela Quinlan – Valtrus Innovations, Ltd.
Paul Riley – Patent Platform Services (licensing representative of Valtrus Innovations, Ltd.)

Patent	Category	Title
US6525936B2	Cooling	Air jet cooling arrangement for electronic systems
US6609208B1	Power Management	Energy-based sampling for performance monitoring
US6644481B2	Rack	Apparatus and method for rackmounting a chassis
US6650537B2	Power Management	Low profile DC distribution module for a power supply unit
US6657867B2	Rack	Hinged door for access to add-in cards
US6661651B1	Rack	Mounting of data storage devices with compliant storage module covers
US6666340B2	Rack	Universal rack rail
US6702124B2	Rack	Flat spring clip for tool-less slide installation
US6718277B2	Cooling	Atmospheric control within a building
US6829142B2	Cooling	Cell thermal connector
US6832168B2	Power Management	Method and system for verifying network device power cabling configuration
US6832927B2	Rack	Low profile PCI hot plug actuator assembly
US6834811B1	Cooling	Market-based temperature control system and method
US6848114B2	Rack	Bulk access system for a data storage system
US6850866B2	Management	Managing performance metrics describing a relationship between a provider and a client
US6854284B2	Cooling	Cooling of data centers
US6854287B2	Cooling	Cooling system
US6858792B2	Rack	Tool-less coupling assembly
US6862179B2	Cooling	Partition for varying the supply of cooling fluid
US6862185B2	Cooling	Systems and methods that use at least one component to remove the heat generated by at least one other component
US6862186B2	Heat sink	Stack up assembly
US6868682B2	Cooling	Agent based control method and system for energy management
US6868683B2	Cooling	Cooling of data centers
US6873530B2	Heat sink	Stack up assembly
US6876549B2	Cooling	Method and apparatus for individually cooling components of electronic systems
US6879487B2	Cooling	Fan-securing device for use with a heat transfer device
US6886353B2	Cooling	Cooling system

Patent	Category	Title
US6900987B2	Heat sink	Stack up assembly
US6901303B2	Cooling	Method and apparatus for controlling fans and power supplies to provide accelerated run-in testing
US6904968B2	Cooling	Method and apparatus for individually cooling components of electronic systems
US6922340B2	Heat sink	Stack up assembly
US6928580B2	Management	Distributed data center system protocol for continuity of service in the event of disaster failures
US6935419B2	Heat sink	Heat sink apparatus with air duct
US6938433B2	Cooling	Cooling system with evaporators distributed in series
US6945058B2	Cooling	Cooling of data centers
US6947286B2	Heat sink	Stack up assembly
US6963970B2	Management	System and method for executing a fast reset of a computer system
US6982877B2	Heat sink	Heat sink having compliant interface to span multiple components
US7013968B2	Cooling	Method and apparatus for individually cooling components of electronic systems
US7020145B1	Management	Network topology manager
US7027309B2	Rack	Engaging/disengaging mechanism
US7031870B2	Cooling	Data center evaluation using an air re-circulation index
US7054156B2	Cooling	Fan rotor systems having collapsible fan blades
US7075788B2	Cooling	Computer cooling system and method
US7079390B2	Heat sink	System and method for heat dissipation and air flow redirection in a chassis
US7082032B1	Heat sink	Heat dissipation device with tilted fins
US7086459B2	Cooling	Method and apparatus for individually cooling components of electronic systems
US7145775B2	Heat sink	Chassis conducted cooling thermal dissipation apparatus for servers
US7152174B2	Power Management	Method and apparatus for operating a server system including determining the power supplied by one of a plurality of power supplies by measuring voltage on a load share signal line

Patent	Category	Title
US7222246B2	Power Management	Method for determining number of dynamically temperature-adjusted power supply units needed to supply power according to measure operating temperature of power supply units
US7251547B2	Cooling	Correlation of vent tile settings and rack temperatures
US7251588B2	Management	System for metric introspection in monitoring sources
US7269753B2	Power Management	Mapping power system components
US7336490B2	Heat sink	Multi-chip module with power system
US7337018B2	Cooling	Heat sink fan management based on performance requirements
US7339490B2	Rack	Modular sensor assembly
US7360295B2	Rack	System and method for securely positioning apparatus within a housing
US7447026B2	Cooling	System for hot swapping heat exchangers
US7499281B2	Heat sink	Multi-chip module with power system
US7499286B2	Rack	Mounting adapter for electronic modules
US7512825B2	Power Management	Responding to DC power degradation
US7514816B2	Power Management	Output current threshold adjustment for a power supply
US7546475B2	Power Management	Power-aware adaptation in a data center
US7548421B2	Cooling	Impingement cooling of components in an electronic system
US7555751B1	Management	Method and system for performing a live system upgrade
US7765299B2	Rack	Dynamic adaptive server provisioning for blade architectures
US7822857B2	Management	Methods and systems for sharing remote access
US7895455B2	Power Management	Dynamic converter control for efficient operation
US7939967B2	Power Management	Multiple power supply control
US7995339B2	Cooling	Control of vent tiles correlated with a rack
US8214786B2	Rack	Scalable, component-accessible, and highly interconnected three-dimensional component arrangement within a system
US8353489B2	Rack	Mounting kit
US8355251B2	Rack	Remote exhaust for rack systems

Patent	**Category**	**Title**
US8355828B2	Power Management	Determining optimal settings for resource actuators
US8379538B2	Management	Model-driven monitoring architecture
US8395896B2	Cooling	Redundant cooling systems and methods
US8526325B2	Management	Detecting and identifying connectivity in a network
US8539059B2	Cooling	Managing cooling devices and computing nodes in an infrastructure
US8661283B2	Power Management	Power distribution unit-device correlation
US8676931B1	Management	Methods for managing manual changes to network infrastructures through automated systems
US8677365B2	Cooling	Performing zone-based workload scheduling according to environmental conditions
US8694991B2	Management	Server virtualized using virtualization platform
US8712597B2	Cooling	Method of optimizing air mover performance characteristics to minimize temperature variations in a computing system enclosure
US8782450B2	Power Management	Power capping system and method
US8798964B2	Rack	Methods and apparatus for designing the racking and wiring configurations for pieces of hardware
US9098276B2	Power Management	Redundant power supply systems and methods
US9179580B2	Cooling	Data center cooler with chiller and cooling tower
US9240931B2	Management	Information technology service management
US9310855B2	Cooling	Flexible data center and methods for deployment
US9354678B2	Cooling	Enclosure airflow controller
US9395786B2	Power Management	Cross-layer power management in a multi-layer system

U.S. Patent No. 6,862,179 – Infringement Claim Chart

Claim 1	Exemplary Evidence of Infringement by CyrusOne
[1pre] A method of cooling a plurality of racks in a data center, said method comprising:	CyrusOne's data centers use a method of cooling a plurality of racks in a data center. For example, CyrusOne uses Vertiv (Liebert) downflow chilled water CRAC units in the colocation data center. Liebert CRAC units are controlled by Liebert's iCOM Intelligent Communication and Monitoring system.  https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-CIN97_Cincinnati.pdf, p. 1.

Claim 1	Exemplary Evidence of Infringement by CyrusOne

Cooling

- N+1 Cooling
- Redundant DX and Glycol Chillers
- Redundant raised floor CRAC units
- 12in Raised floor

https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-CIN97_Cincinnati.pdf, p. 2.

https://www.vertiv.com/49d637/globalassets/shared/liebert-icom-thermal-system-controls-brochure.pdf ("iCOM Brochure").

Claim 1	Exemplary Evidence of Infringement by CyrusOne

At the cooling unit level, the Liebert iCOM unit control provides the highest protection available and optimal performance.

- Monitors 380 unit and component points to eliminate single points of failure
- Self-healing features avoid passing unsafe operating thresholds
- Highly intuitive, full-color, touch screen simplifies operations to save time and reduce human error
- Multiple, automated unit protection routines, including lead/lag, cascade, rapid restart, refrigerant protection and valve calibration

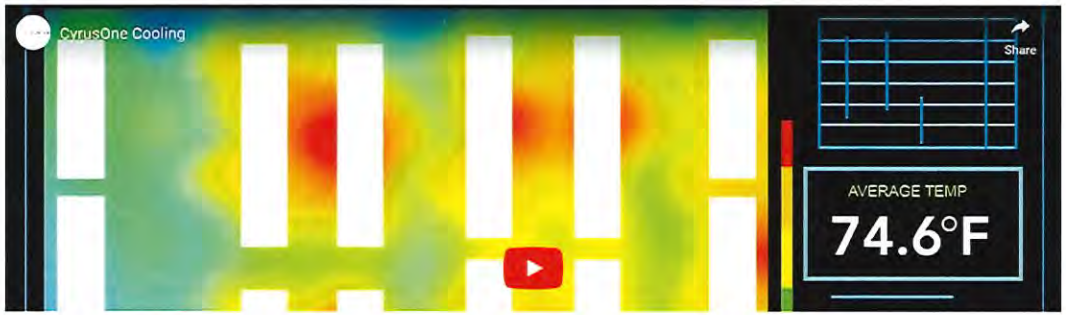
At the supervisory level, the Liebert iCOM-S system control offers a revolutionary way to harmonize and optimize thermal system performance to optimize capacity across the data center, gain quick access to actionable data, and automate system diagnostics and trending.

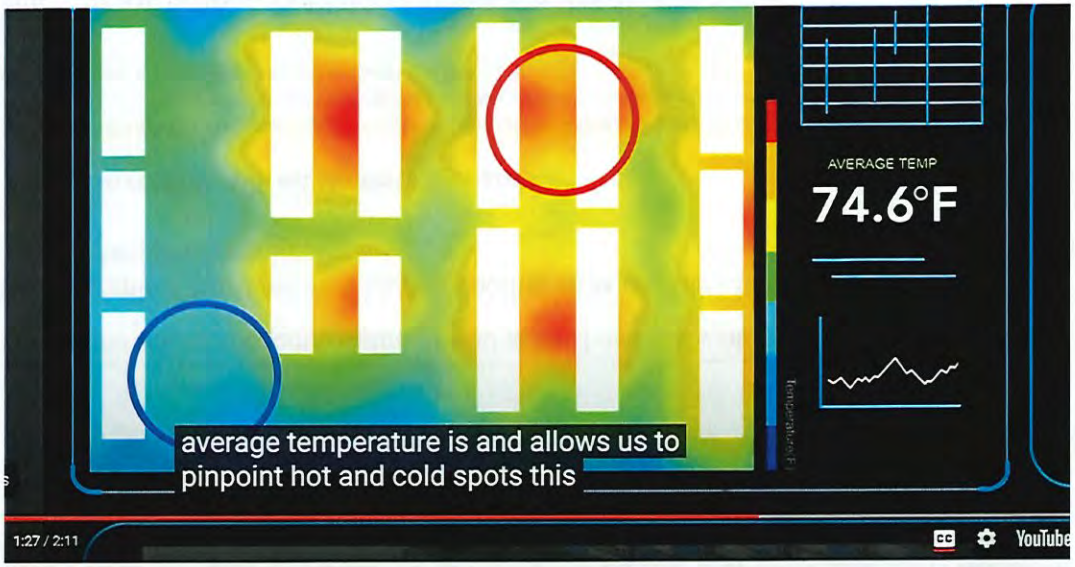
- Advanced monitoring and at-a-glance reporting on performance metrics and trends for efficiency, capacity and adverse events
- Up to 50% system efficiency gains
- 30% lower deployment costs
- Teamwork modes that prevent conflict between units and allow them to adapt to changes in facility and IT demand to improve efficiency and availability and reduce system wear and tear – saving more than $10,000 per unit per year in energy costs
- Simple and easy to deploy — auto-configuration to detect and configure up to 4,800 sensors, eliminating the need for custom integration to building management systems and cutting sensor deployment times in half

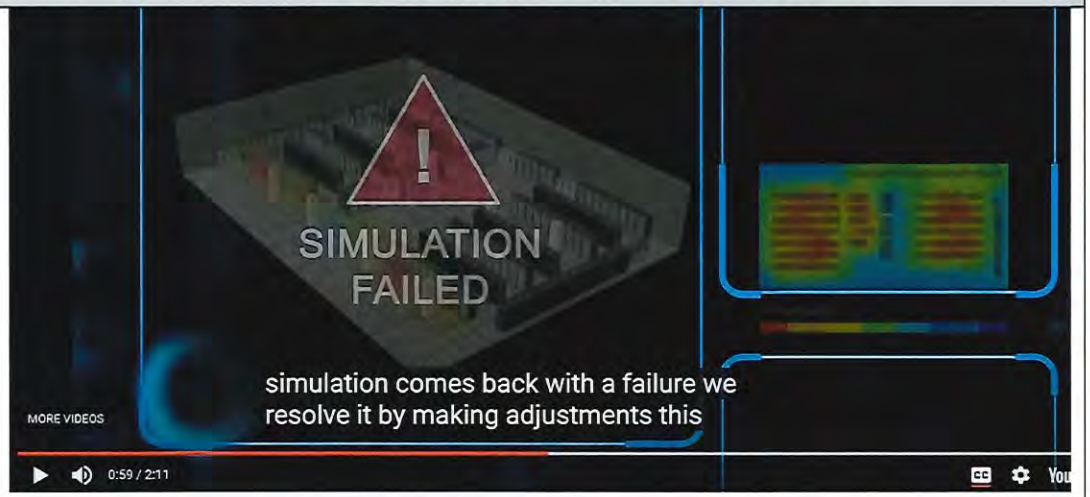
Liebert iCOM unit control and Liebert iCOM-S system control are available for new Vertiv™ data center cooling units or as retrofits.

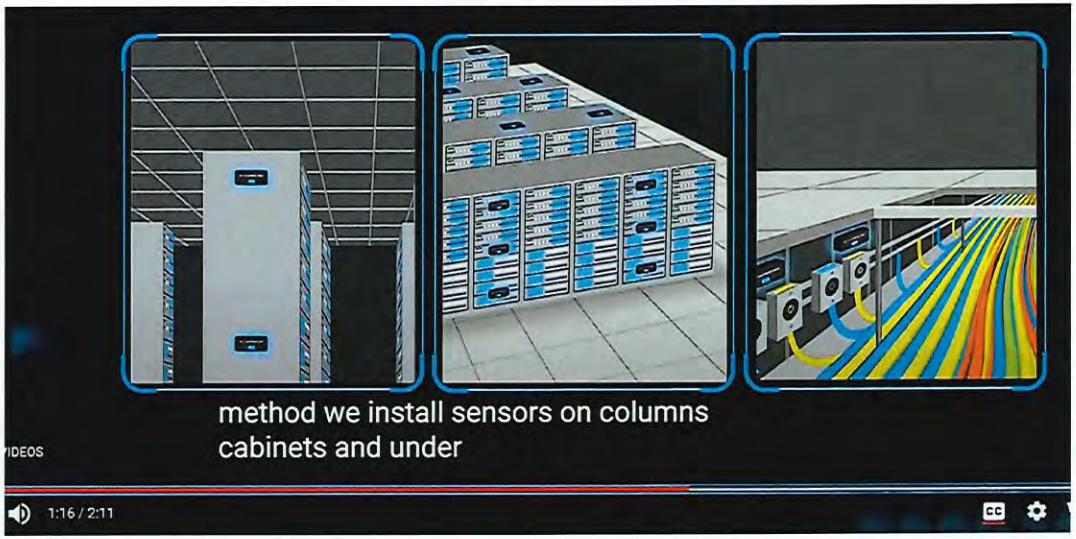
iCOM Brochure at p. 3.

CyrusOne also uses CyrusOne cooling to continuously optimize air flow in its colocation data centers.

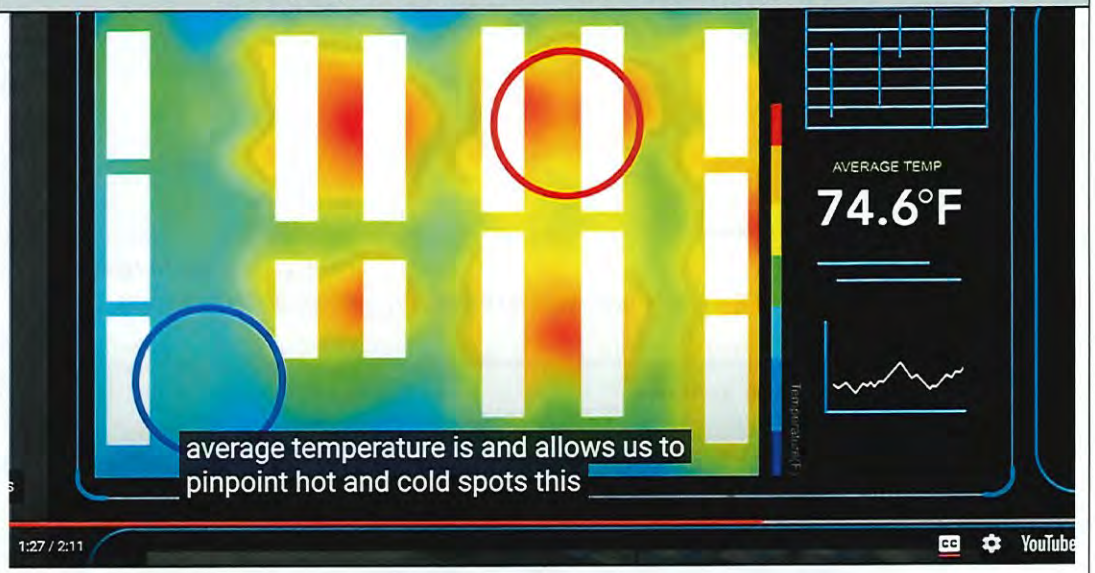
Claim 1	Exemplary Evidence of Infringement by CyrusOne
	CyrusOne's data center cooling systems are some of the most advanced in the world employing proactive and reactive methods to keep customer's data halls running at the most optimal temperatures.  https://www.cyrusone.com/data-center-solutions/colocation
[1a] activating a cooling device and opening a controllable partition configured to vary a supply of cooling fluid within a zone of said data center, said zone including at least one associated rack of said plurality of racks;	CyrusOne activates a cooling device and opening a controllable partition configured to vary a supply of cooling fluid within a zone of said data center, said zone including at least one associated rack of said plurality of racks. For example, Liebert's iCOM Intelligent Communication and Monitoring fluid economizer system activates the flow of chilled water/glycol, and varies cooling capacity by adjusting a motorized ball valve (controllable partition). **7.1.4 Temperature Control with a Fluid Economizer** When an economizer is installed, the cooling requirement (determined by the temperature proportional band) is addressed first by the economizer's secondary cooling, if the economizer cooling capacity is insufficient, the compressor(s) begin cooling to bring the room air temperature down to the temperature setpoint. The fluid economizer employs a motorized ball valve that controls the flow of chilled water/glycol to provide a cooling capacity from 0% to 100%. https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 110.

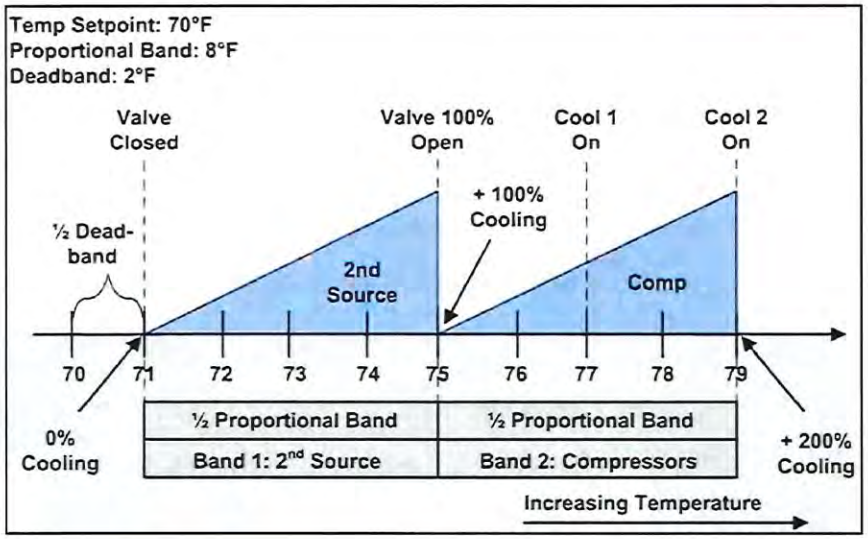
Claim 1	Exemplary Evidence of Infringement by CyrusOne
	CyrusOne also uses CyrusOne Cooling which is a closed-loop system that reacts to real-time data, automatically identifies and eliminates hot spots and helps diagnose potential facility risks by making adjustments.  https://www.cyrusone.com/data-center-solutions/colocation , at 1:27;

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	 https://www.cyrusone.com/data-center-solutions/colocation , at 0:59;
[1b] sensing the temperature of said at least one associated rack;	CyrusOne senses the temperature of said at least one associated rack. For example, CyrusOne uses Liebert cooling units and the Liebert cooling unit control system senses temperatures. **13.2 Installing Wired Remote Sensors** Up to 10 remote sensor modules, installed in the monitored racks and connected to the cooling unit, provide control and reference input to iCOM and building-management systems. Using remote, rack sensors combats cooling problems related to recirculation air, uneven rack loading, and air distribution. https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 180. CyrusOne also uses CyrusOne cooling which installs temperature sensors to determine exactly where the heat load is within the data center. Data is wirelessly transmitted to

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	network gateways, aggregated, and sent to a purpose-built appliance where it is analyzed by control software. Control commands are then delivered to the cooling equipment.  https://www.youtube.com/watch?v=yFMS-88wXn8, at 1:16.
[1c] determining whether said sensed temperature is within a predetermined temperature range; and	CyrusOne determines whether said sensed temperature is within a predetermined temperature range. For example, CyrusOne uses the Liebert iCOM system which is able to identify if the temperature is at the setpoint value, and change the response to the varied flow field based on length of time temperature has deviated, and amount of deviation from setpoint.

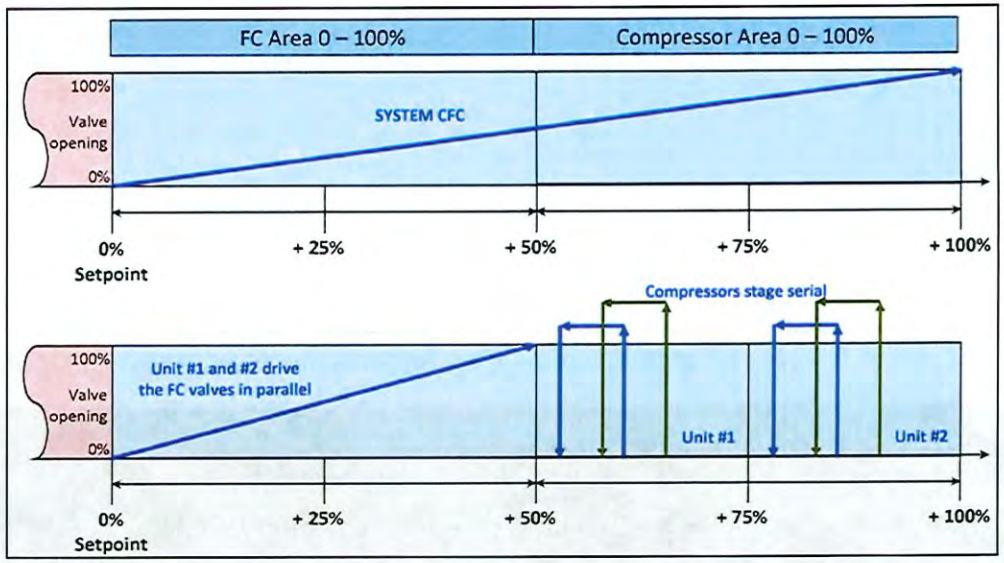
Claim 1	Exemplary Evidence of Infringement by CyrusOne
	Temperature Integration Time Adjusts amount of cooling/heating based on the length of time the temperature has deviated from the setpoint. The time selected is the amount of time it will take cooling capacity to reach 100%. For example, if three minutes is selected, cooling capacity will increase to 100% in three minutes. NOTE: Three to five minutes of integration time is adequate for most applications. See Considerations when Using PI Temperature Control on page 28 . NOTE: Only used when Temperature Control Type is PI. **Temperature Proportional Band** Adjusts the activation point of cooling/heating components based on deviation from setpoint by placing half of the selected value on each side of the temperature control setpoint. A smaller number causes faster reaction to temperature changes. NOTE: Setting this too low causes short cycling of compressors. https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 25. CyrusOne also uses CyrusOne Cooling to determine whether the sensed temperature is within a predetermined temperature range, for example, by using hot and cold spots.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	 https://www.cyrusone.com/data-center-solutions/colocation , at 1:27;
[1d] manipulating said controllable partition to vary said supply of said cooling fluid to said zone in response to said sensed temperature being outside said predetermined temperature range.	CyrusOne manipulates said controllable partition to vary said supply of said cooling fluid to said zone in response to said sensed temperature being outside said predetermined temperature range. CyrusOne uses Liebert's iCOM system to manipulate the motorized ball valve (controllable partition) from 0% to 100% flow of chilled water/glycol. **7.1.4 Temperature Control with a Fluid Economizer** When an economizer is installed, the cooling requirement (determined by the temperature proportional band) is addressed first by the economizer's secondary cooling, if the economizer cooling capacity is insufficient, the compressor(s) begin cooling to bring the room air temperature down to the temperature setpoint. The fluid economizer employs a motorized ball valve that controls the flow of chilled water/glycol to provide a cooling capacity from 0% to 100%.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 110. Figure 3.17 Second Cooling Source and Two-Step Compressorized Cooling  https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 69, Fig. 3.17.

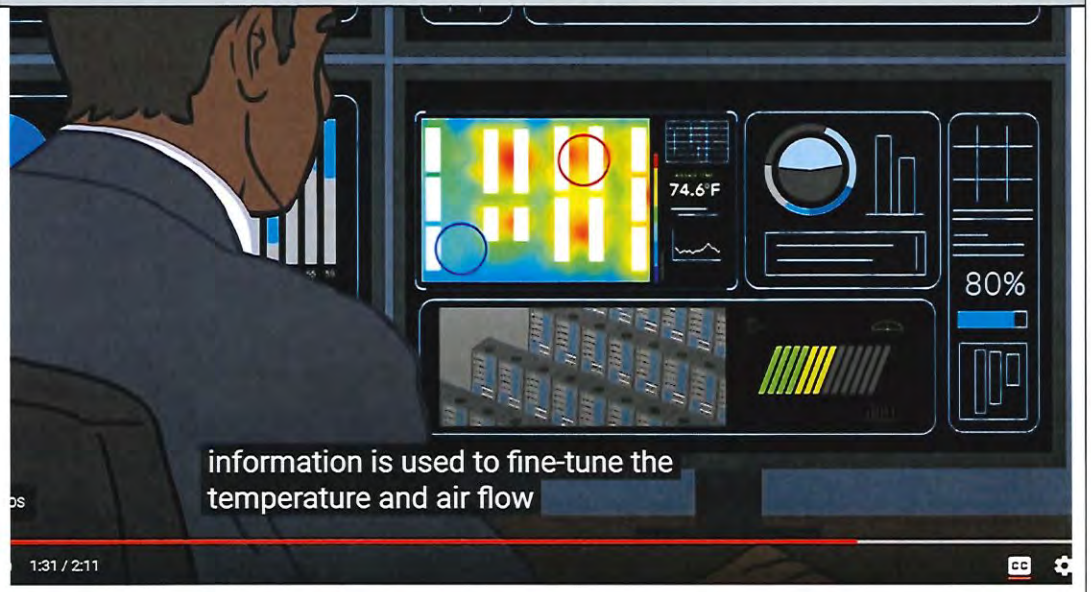
Claim 1	Exemplary Evidence of Infringement by CyrusOne

Figure 3.18 Freecooling and Compressorized Operation



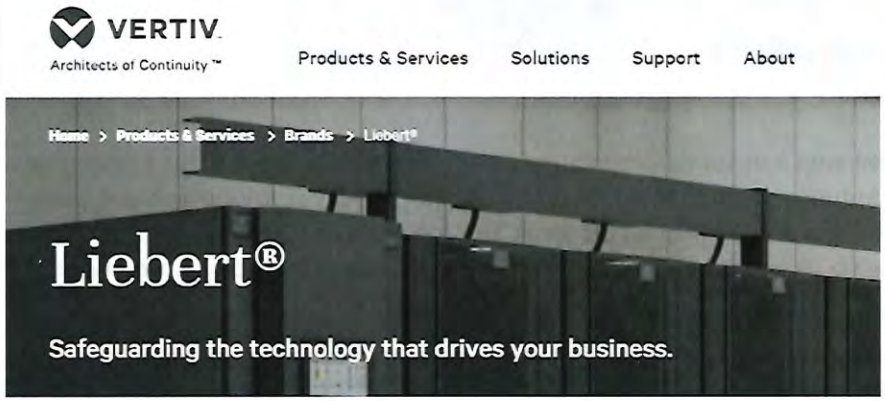
https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 70, Fig. 3.18.

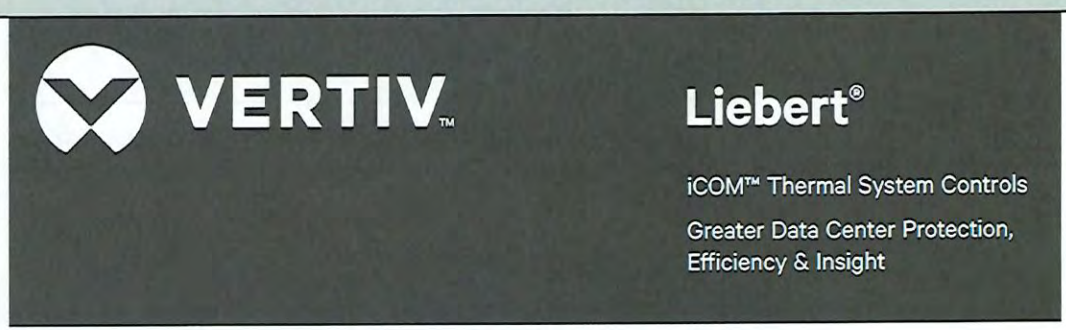
CyrusOne also uses CyrusOne Cooling Optimize to adjust cooling output by fine-tuning the air flow.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	 https://www.cyrusone.com/data-center-solutions/colocation , at 1:31;

U.S. Patent No. 6,718,277 – Infringement Claim Chart

Claim 1	Exemplary Evidence of Infringement by CyrusOne
[1pre] A method of controlling atmospheric conditions within a building, said method comprising the steps of:	CyrusOne's data centers use a method of controlling atmospheric conditions within a building. CyrusOne uses Vertiv and Liebert cooling in its U.S. data centers to control atmospheric conditions. Liebert's cooling units are controlled, for example, by Liebert's iCOM and/or iCOM-S Intelligent Communication and Monitoring System, which uses a method for evaluating one or more components in a data center.  https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-CIN97_Cincinnati.pdf, p. 1.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	Cooling • N+1 Cooling • Redundant DX and Glycol Chillers • Redundant raised floor CRAC units • 12in Raised floor https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-CIN97_Cincinnati.pdf, p. 2.  https://www.vertiv.com/en-us/products/brands/liebert/

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	 https://www.vertiv.com/49d637/globalassets/shared/liebert-icom-thermal-system-controls-brochure.pdf ("iCOM Brochure").

Claim 1	Exemplary Evidence of Infringement by CyrusOne

At the cooling unit level, the Liebert iCOM unit control provides the highest protection available and optimal performance.

- Monitors 380 unit and component points to eliminate single points of failure
- Self-healing features avoid passing unsafe operating thresholds
- Highly intuitive, full-color, touch screen simplifies operations to save time and reduce human error
- Multiple, automated unit protection routines, including lead/lag, cascade, rapid restart, refrigerant protection and valve calibration

At the supervisory level, the Liebert iCOM-S system control offers a revolutionary way to harmonize and optimize thermal system performance to optimize capacity across the data center, gain quick access to actionable data, and automate system diagnostics and trending.

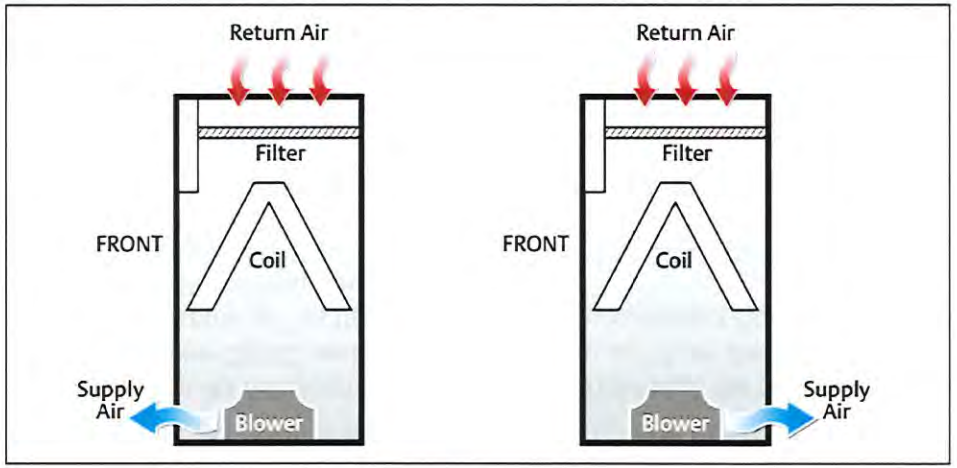
- Advanced monitoring and at-a-glance reporting on performance metrics and trends for efficiency, capacity and adverse events
- Up to 50% system efficiency gains
- 30% lower deployment costs
- Teamwork modes that prevent conflict between units and allow them to adapt to changes in facility and IT demand to improve efficiency and availability and reduce system wear and tear – saving more than $10,000 per unit per year in energy costs
- Simple and easy to deploy — auto-configuration to detect and configure up to 4,800 sensors, eliminating the need for custom integration to building management systems and cutting sensor deployment times in half

Liebert iCOM unit control and Liebert iCOM-S system control are available for new Vertiv™ data center cooling units or as retrofits.

iCOM Brochure at p. 3.

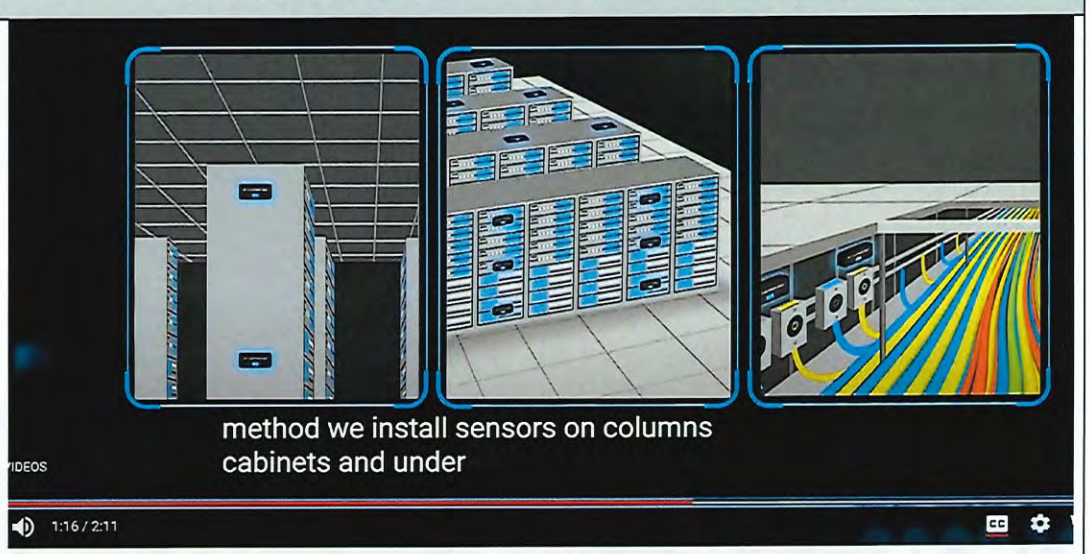
CyrusOne also uses CyrusOne cooling software to measure, monitor, and manage atmospheric conditions in its data centers.

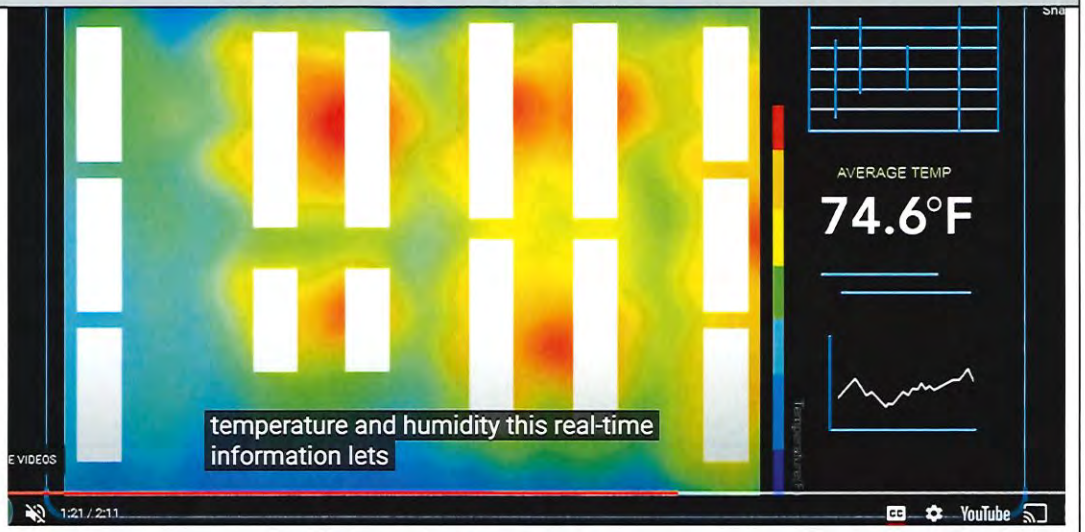
Claim 1	Exemplary Evidence of Infringement by CyrusOne
	CyrusOne's data center cooling systems are some of the most advanced in the world employing proactive and reactive methods to keep customer's data halls running at the most optimal temperatures.  https://www.cyrusone.com/data-center-solutions/colocation
[1a] supplying a conditioned fluid inside said building;	CyrusOne supplies a conditioned fluid inside said building. For example, CyrusOne uses CRAC units inside its data centers to supply conditioned fluid. CyrusOne uses Liebert to control atmospheric conditions in the data center with its CRAC units. CyrusOne supplies refrigerant (conditioned fluid) through the coil of its Liebert CRAC units. The Liebert CRAC unit receives the "return air" from the room and delivers cool conditioned "supply air" to the room (supplying conditioned fluid), by transferring heat from the air to the cooling fluid within the coil.

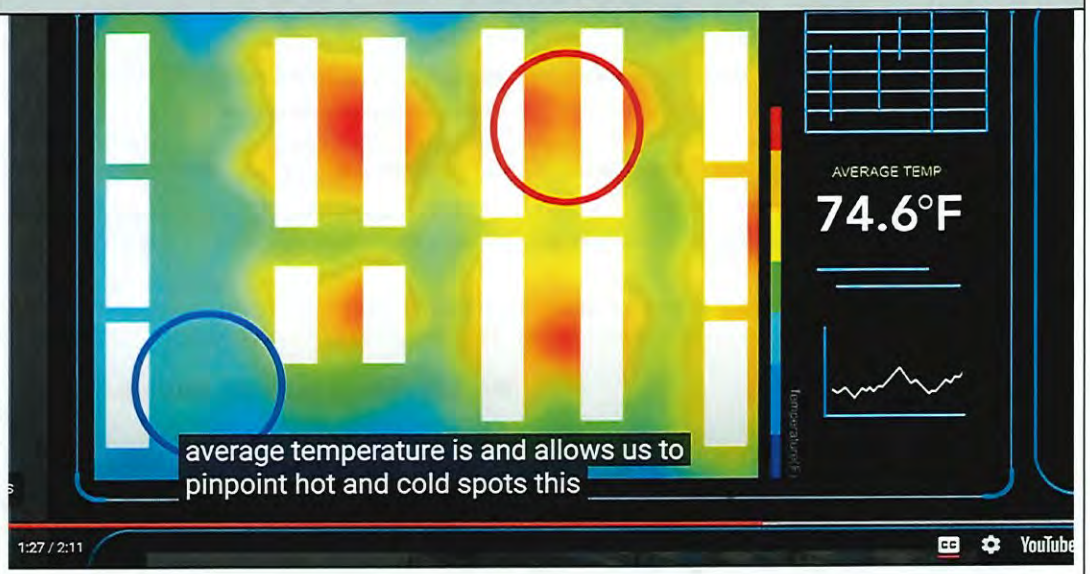
Claim 1	Exemplary Evidence of Infringement by CyrusOne
	 https://www.vertiv.com/4afe7d/globalassets/products/thermal-management/room-cooling/liebert-dse-80-165kw-23-43-tons-downflow-system-design-manual.pdf, at p. 6. Regardless of which type of CRAC units or which method of controlling atmospheric conditions are used (Liebert, CyrusOne, or others), CyrusOne supplies a conditioned fluid inside each of its data centers.
[1b] sensing at least one atmospheric parameter in a plurality of locations inside said building;	CyrusOne senses at least one atmospheric parameter in a plurality of locations inside said building. For example, CyrusOne uses Liebert iCOM. Liebert iCOM senses temperatures and humidity at locations throughout the data center.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	User Temperature Setpoint Options **2nd Temperature Setpoint** Alternate setpoint activated by customer input (remote alarm device). When customer input connection is 2nd Setpoint, this value becomes the active temperature setpoint. **BMS Backup Temp Setpoint** Selects a temperature setpoint that activates in the event of a BMS timeout. The BMS timer must be configured for this setpoint to activate. See Setting BMS Backup Setpoints on page 117 . **Optimized Aisle Enabled** Read-only. Indicates that iCOM™ is configured for optimized-aisle operation. See Teamwork Mode 3—Optimized Aisle Operation on page 102 . **Temperature Control Sensor** Selects sensor that controls cooling. Values are: • Supply Sensor: Temperature control is based on maintaining the temperature of the discharge air from the cooling unit. See Supply Sensors on page 158 . • Remote Sensor: Temperature control is based on the temperature reading(s) from wired remote sensor(s). See Wired Remote Sensors on page 156 . • Return Sensor: Temperature control is based on maintaining the temperature of the air returning to the cooling unit.

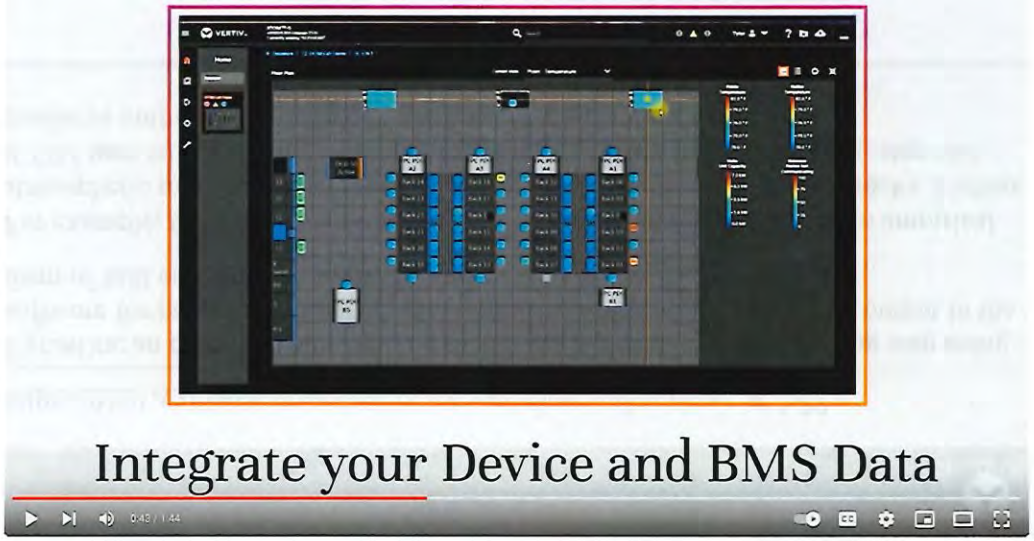
Claim 1	Exemplary Evidence of Infringement by CyrusOne
	User Humidity Setpoint Options **Dew Point Setpoint** Desired dew point (based on actual return air temperature and humidity) by adding moisture to or removing moisture from the air. **Humidity Control Sensor** Selects sensor used when calculating relative humidity. **Humidity Control Type** Control when staging humidification operations. Valid values: • Relative: Percent of humidification/dehumidification is determined by the difference between the humidity-sensor reading and the humidity setpoint. • Compensated: Percent of humidification/dehumidification is determined by considering the actual deviation from the temperature setpoint and adjusts the humidity setpoint accordingly. The recalculated humidity setpoint displays on the screen. • Predictive: Percent of humidification/dehumidification is determined by considering the actual deviation from the temperature setpoint and adjusts the humidity sensor reading accordingly. The adjusted humidity sensor reading displays on the screen. • Dew point: Percent of humidification/dehumidification is determined by the difference between the dew point calculated from the humidity sensor reading and the dew point setpoint. https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf ("iCOM Manual") at p. 15-16. CyrusOne also uses CyrusOne Cooling to sense temperatures based on real sensor readings at various locations inside the data center.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	 https://www.youtube.com/watch?v=yFMS-88wXn8, at 1:16.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	 https://www.youtube.com/watch?v=yFMS-88wXn8, at 1:21.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	 https://www.cyrusone.com/data-center-solutions/colocation , at 1:27;
[1c] generating an empirical atmospheric map from the results of said sensing step using software for processing input from said sensing step and for producing output in the form of said empirical atmospheric map;	CyrusOne an empirical atmospheric map from the results of said sensing step using software for processing input from said sensing step and for producing output in the form of said empirical atmospheric map. For example, CyrusOne uses Liebert iCOM. Liebert iCOM generates an empirical atmospheric map from the results of sensing temperature at individual racks. Liebert iCOM uses software for processing temperature inputs from the sensing step and produces output in the form of a data center temperature map.

Claim 1	Exemplary Evidence of Infringement by CyrusOne



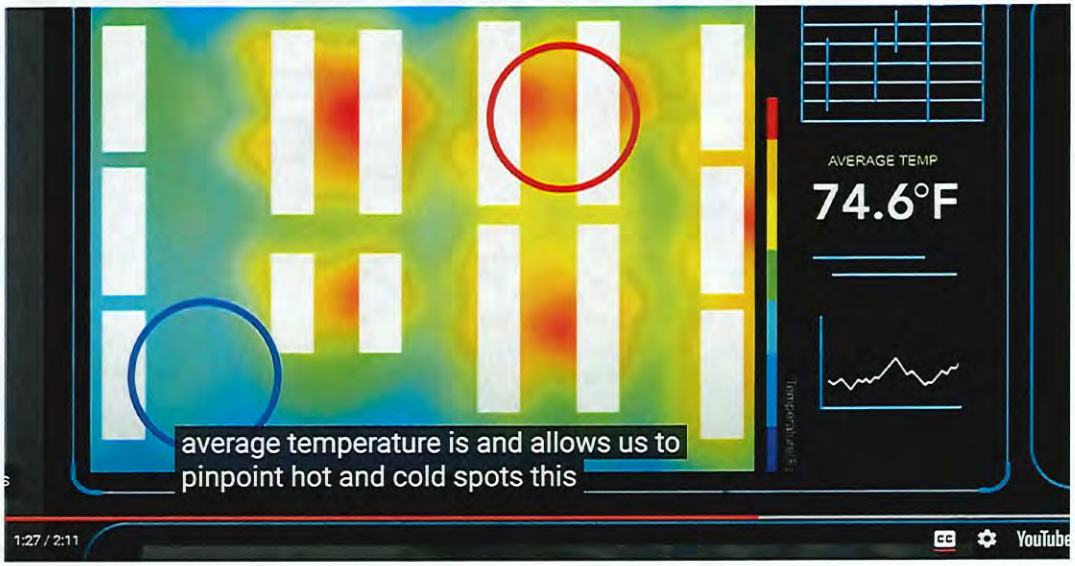
https://www.youtube.com/watch?v=pJutGw7rrF0 at 0:43.

5.1 Preparing for U2U Group Set Up

Cooling units in the network will be assigned to groups, which affects how units function in teamwork, standby, rotation, and cascading operations. Especially in large rooms, it is important to consider several factors before setting up groups to balance cooling unit operation with room conditions.

NOTE: For ease of set-up and use, we recommend using only one group unless you have multiple rooms, differing software versions, or different types of cooling units.

1. Make a map of the room and indicate the location of all heat-generating devices and cooling units to plan for proper heat load management and cooling-air distribution.
2. Note the type of units by product/model, size, etc.
3. Determine the number of units to network together to ensure proper air flow and environmental control, up to 32 units.
4. Determine number of standby units.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	iCOM Manual at p. 94. CyrusOne also uses CyrusOne cooling to generate a 3D temperature map based on real sensor readings retrieved throughout the data center. CyrusOne cooling processes temperature inputs from the sensing step and produces output in the form of a data center temperature map, which can be viewed as a calculated or measured map.  https://www.cyrusone.com/data-center-solutions/colocation , at 1:27;
[1d] comparing said empirical atmospheric map to a template atmospheric map; and	CyrusOne compares said empirical atmospheric map to a template atmospheric map. For example, CyrusOne uses Liebert iCOM. Liebert iCOM compares an empirical atmospheric map to a template atmospheric map, for instance by comparing current temperatures to template setpoints.

Claim 1	Exemplary Evidence of Infringement by CyrusOne

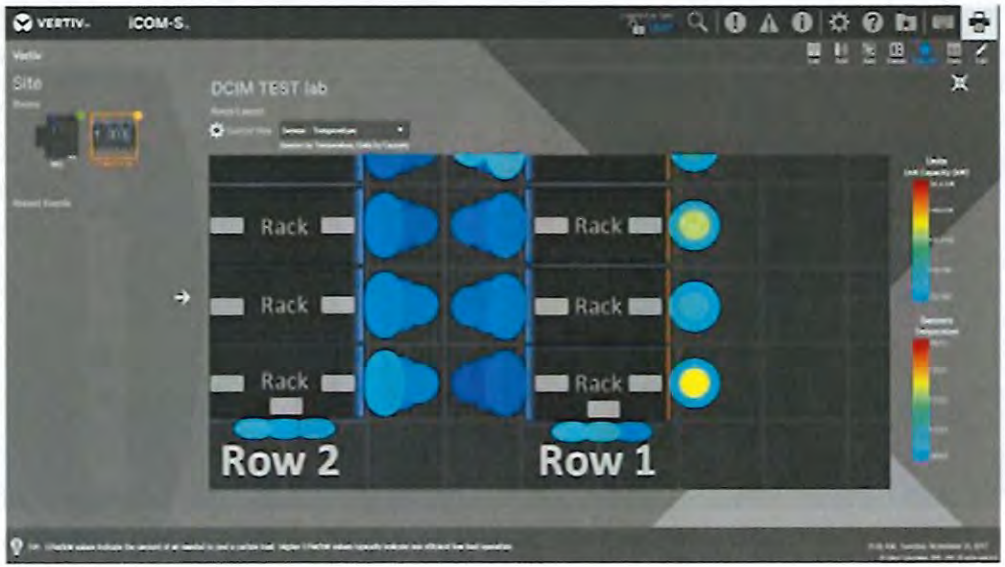
2.4 Viewing Sensor Data

The Sensor Data panel lists the standard and optional sensors monitored by iCOM™and the current reading of each sensor.

- Touch  , then  > *Sensor Data*. The SENSOR DATA panel opens.

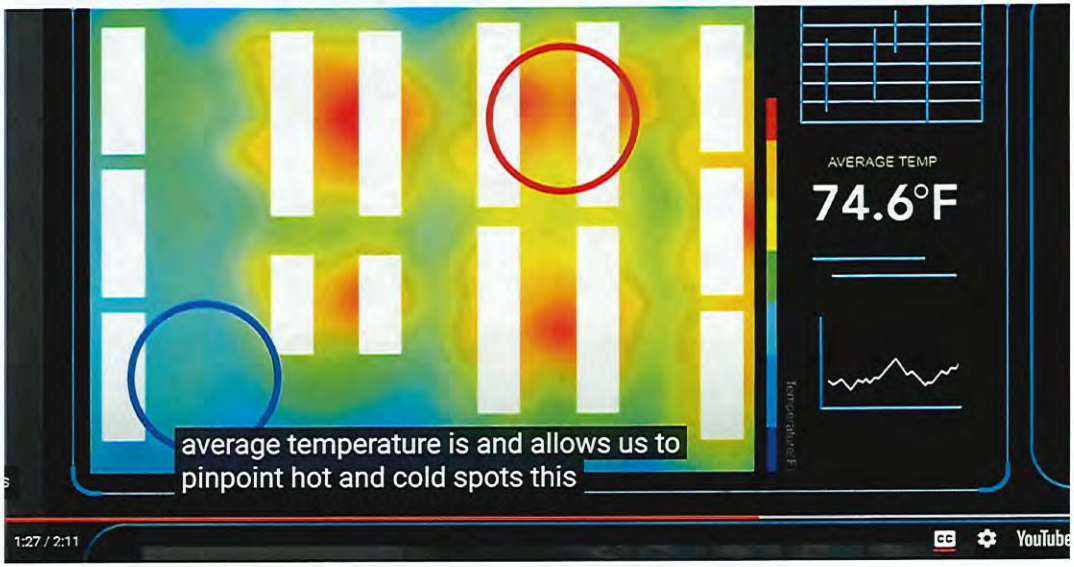
  A secondary panel displays the DAILY SENSOR READING SUMMARY, which shows temperature, humidity and dew-point readings for the cooling unit.

iCOM Manual at p. 20.



https://www.dksh.com/global-en/products/iot/vertiv-thermal-control-and-monitoring

CyrusOne also uses CyrusOne cooling to generate a 3D temperature map based on real sensor readings retrieved throughout the data center. The data center temperature map

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	can be viewed as a calculated or measured map. The measured map can be compared against a template map.  https://www.cyrusone.com/data-center-solutions/colocation , at 1:27;
[1e] identifying pattern differentials between said empirical and template atmospheric maps.	CyrusOne identifies pattern differentials between said empirical and template atmospheric maps. CyrusOne uses Liebert iCOM. Liebert iCOM identifies pattern differentials between the empirical and template maps, for example, by identifying when sensors are reporting conditions that exceed template conditions.

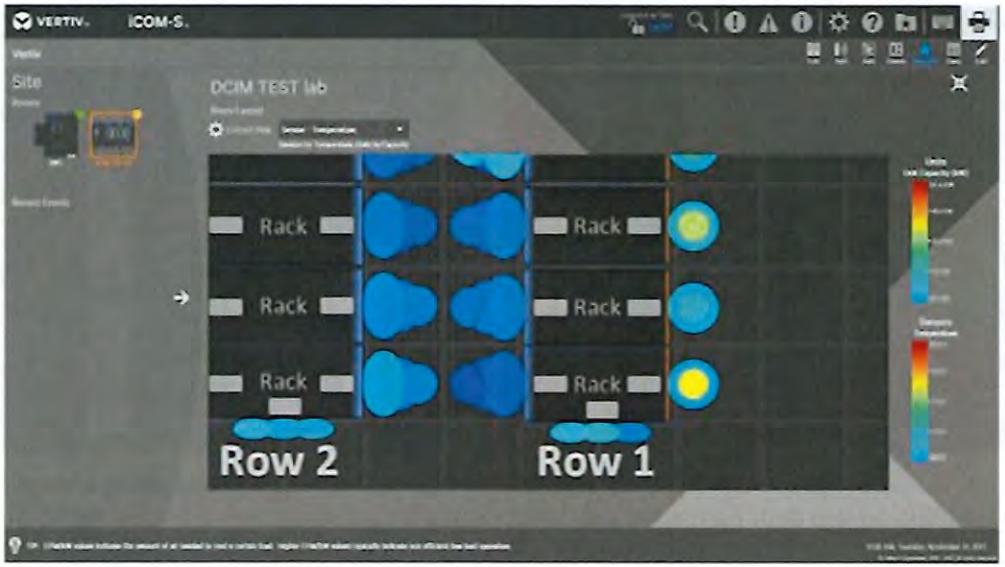
Claim 1	Exemplary Evidence of Infringement by CyrusOne

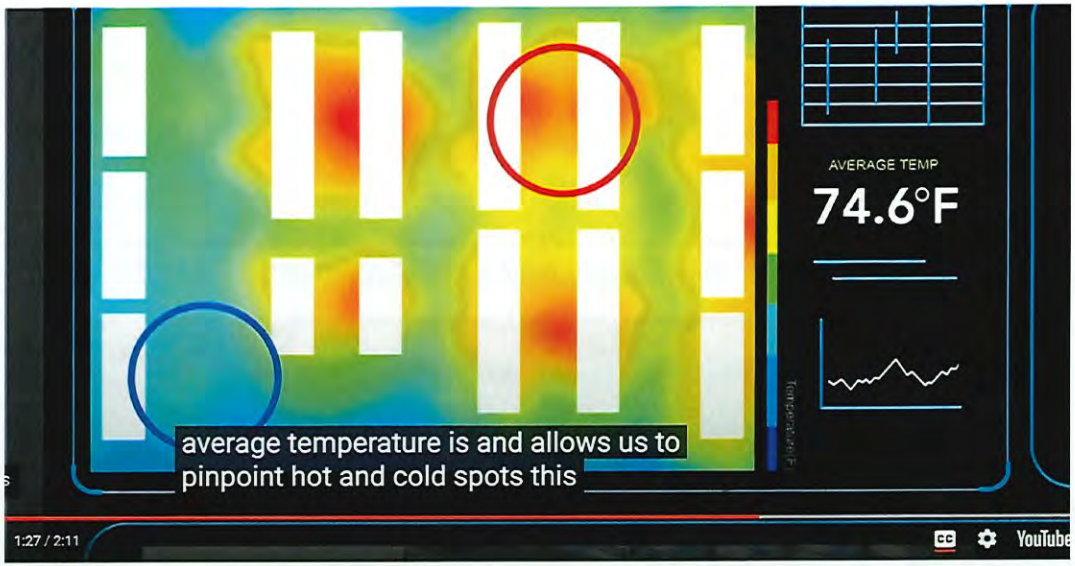
4.2 Enabling Events and Editing Event Settings

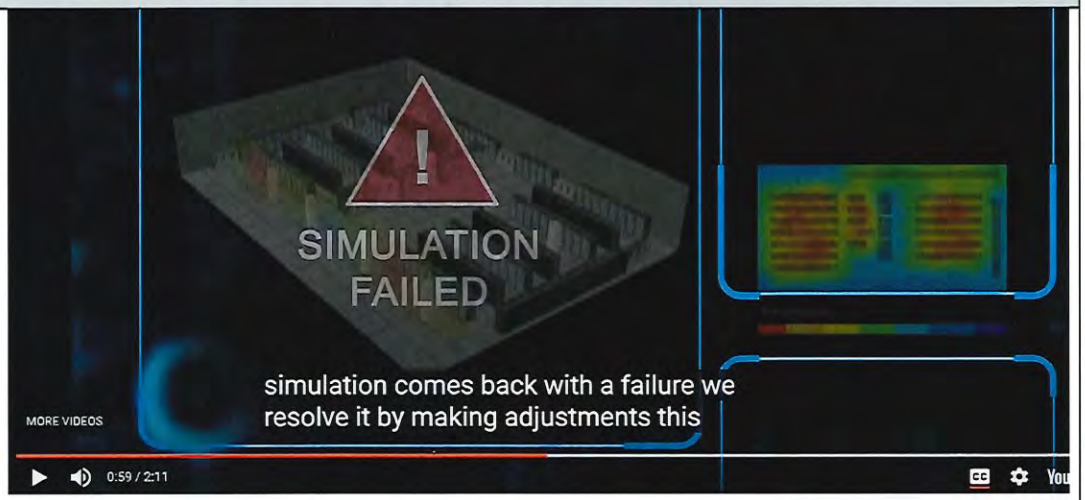
In the ALARMS & EVENTS panel, events are grouped into categories for easier management, for example, the factory set remote sensor alarms and humidification/dehumidification events. In some cases, touch the group heading provides edit options for the entire group, like thresholds, delays and enable/disable. Each event includes settings specific for that event and the notification option where event type and alarm notifications are selected (See Selecting Event Type and Setting Alarm/Warning Notification on the facing page).

1. Touch SERVICE, then ☰ > *Alarm/Event Setup*. The ALARMS & EVENTS panel opens.
2. Scroll or search to find the event, touch the set's heading to display theproperties and values for the entire set in the EDIT panel.
   – or –
   Touch an individual alarm or event to display it's specific values in the EDIT panel.

iCOM Manual at p. 80.

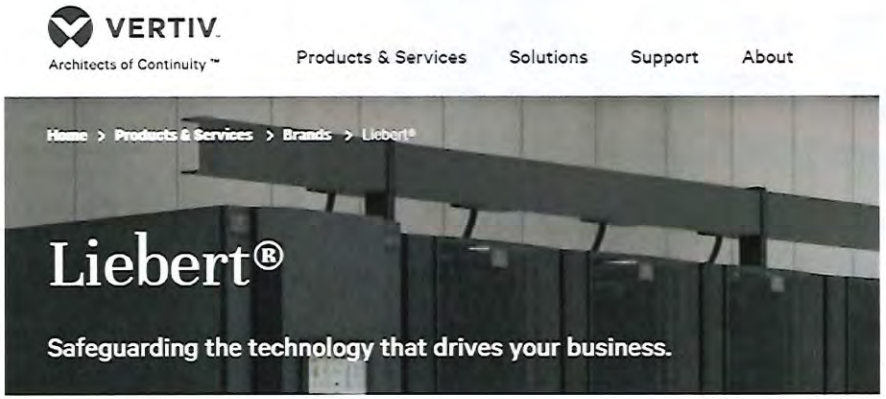


Claim 1	Exemplary Evidence of Infringement by CyrusOne
	https://www.dksh.com/global-en/products/iot/vertiv-thermal-control-and-monitoring CyrusOne also uses CyrusOne cooling to generate a 3D temperature map based on real sensor readings retrieved throughout the data center. CyrusOne cooling determines if there is a failure indication of the effectiveness of the active cooling configuration, which shows pattern differentials between the empirical and template atmospheric maps.  https://www.cyrusone.com/data-center-solutions/colocation , at 1:27;

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	 https://www.cyrusone.com/data-center-solutions/colocation , at 0:59;

U.S. Patent No. 6,854,287 – Infringement Claim Chart

Claim 1	Exemplary Evidence of Infringement by CyrusOne
[1pre] A method for cooling a room configured to house a plurality of computer systems, said method comprising:	CyrusOne's data centers use a method for cooling a room configured to house a plurality of computer systems. For example, CyrusOne uses Vertiv (Liebert) CRAC units in each colocation data center. Liebert CRAC units are controlled by Liebert's iCOM Intelligent Communication and Monitoring system.  https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-CIN97_Cincinnati.pdf, p. 1.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	Cooling • N+1 Cooling • Redundant DX and Glycol Chillers • Redundant raised floor CRAC units • 12in Raised floor https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-CIN97_Cincinnati.pdf, p. 2.  https://www.vertiv.com/en-us/products/brands/liebert/

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	 https://www.vertiv.com/49d637/globalassets/shared/liebert-icom-thermal-system-controls-brochure.pdf ("iCOM Brochure").

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	At the cooling unit level, the Liebert iCOM unit control provides the highest protection available and optimal performance • Monitors 380 unit and component points to eliminate single points of failure • Self-healing features avoid passing unsafe operating thresholds • Highly intuitive, full-color, touch screen simplifies operations to save time and reduce human error • Multiple, automated unit protection routines, including lead/lag, cascade, rapid restart, refrigerant protection and valve calibration  **At the supervisory level,** the Liebert iCOM-S system control offers a revolutionary way to harmonize and optimize thermal system performance to optimize capacity across the data center, gain quick access to actionable data, and automate system diagnostics and trending • Advanced monitoring and at-a-glance reporting on performance metrics and trends for efficiency, capacity and adverse events • Up to 50% system efficiency gains • 30% lower deployment costs • Teamwork modes that prevent conflict between units and allow them to adapt to changes in facility and IT demand to improve efficiency and availability and reduce system wear and tear – saving more than $10,000 per unit per year in energy costs • Simple and easy to deploy — auto-configuration to detect and configure up to 4,800 sensors, eliminating the need for custom integration to building management systems and cutting sensor deployment times in half  Liebert iCOM unit control and Liebert iCOM-S system control are available for new Vertiv™ data center cooling units or as retrofits. iCOM Brochure at p. 3.
[1a] providing a plurality of heat exchanger units configured to receive air from said room and to deliver air to said room;	CyrusOne provides a plurality of heat exchanger units configured to receive air from said room and to deliver air to said room. For example, CyrusOne uses Liebert CRAC units which are heat exchangers that receive air from the room and deliver cool conditioned air to the room by transferring heat from the air to a fluid.

Claim 1	Exemplary Evidence of Infringement by CyrusOne

CIN99

CyrusOne Data Center
Cincinnati - Blue Ash
4600 McAuley Place, 4th Floor
Cincinnati, OH 45242

Located on McAuley Place, this Cincinnati data center facility is for customers that require a robust data center for mission-critical applications, as well as for disaster recovery and business continuity environments.

Overview

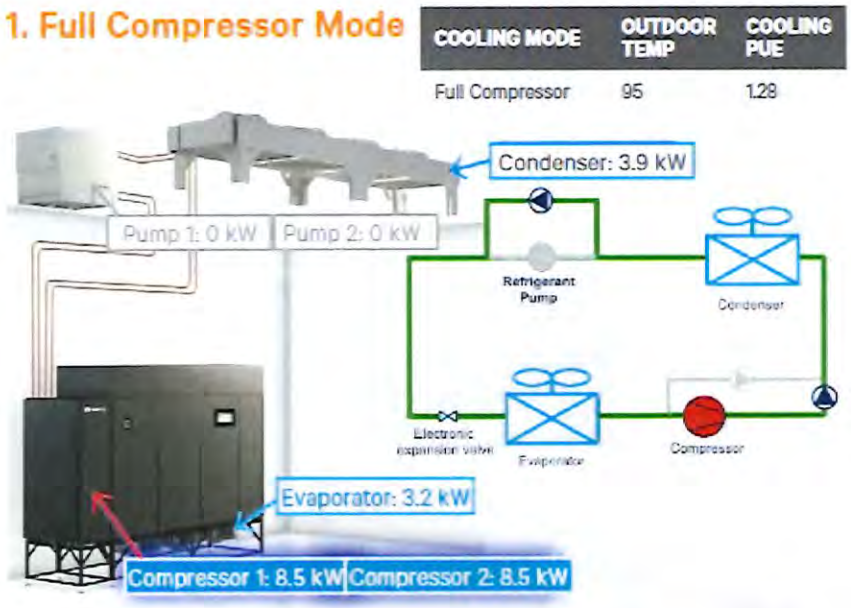
- 15,000 sq. ft. data center/8,000 colo square feet (CSF)
- Up to 900 kW available
- 12-inch raised floor design
- 20- and 22-ton Liebert Downflow Chilled Water CRAC units

https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-CIN97_Cincinnati.pdf, p. 1.

Cooling

- N+1 Cooling
- Redundant DX and Glycol Chillers
- Redundant raised floor CRAC units
- 12in Raised floor

https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-CIN97_Cincinnati.pdf, p. 2.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
[1b] supplying said plurality of heat exchanger units with cooling fluid from an air conditioning unit;	CyrusOne supplies said plurality of heat exchanger units with cooling fluid from an air conditioning unit. For example, CyrusOne uses Liebert's CRAC units which have an evaporator. Refrigerant cooling fluid flows through heat exchanger coils in evaporator.  https://www.vertiv.com/49f1fd/globalassets/products/thermal-management/room-cooling/liebert-dse-sales-brochure-sl-18927_00.pdf CyrusOne uses Liebert CRAC units which have a chilled water control valve. Chilled water cooling fluid flows through heat exchanger coils in evaporator.

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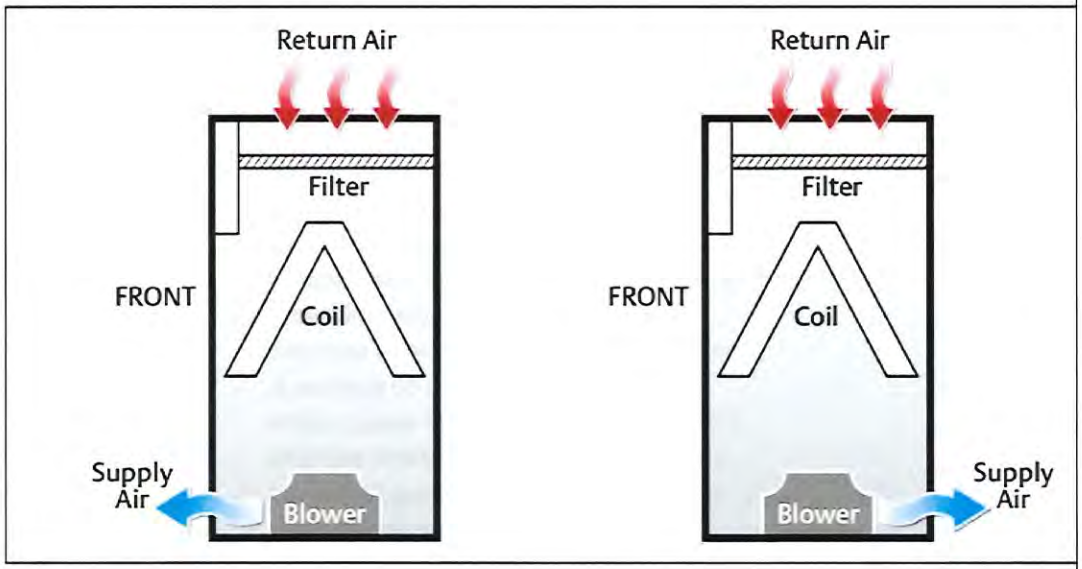
Chilled Water Control Valve

The chilled water valve provides proportional control action in response to room temperature and humidity as sensed by the microprocessor control. It includes operating linkage and electronic motor. Unlike other systems of this nature it requires no over-travel linkage or end switches to be adjusted. The control uses "intelligent logic" to eliminate valve hunting, thus greatly increasing the life of the valve. The valve can be a 3-way or 2-way to meet the appropriate requirements of the installed system.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	https://www.vertiv.com/491dda/globalassets/products/thermal-management/room-cooling/liebert-cw-brochure.pdf.
[1c] cooling said received air through heat exchange with the cooling fluid in the plurality of heat exchanger units;	CyrusOne cools said received air through heat exchange with the cooling fluid in the plurality of heat exchanger units. For example, CyrusOne uses Liebert CRAC units to cool fluid (refrigerant) through the coil. The cooling fluid through the coil is chilled water/glycol. Liebert CRAC units receive the "return air" from the room and deliver cool conditioned "supply air" to the room, by transferring heat from the air to the cooling fluid within the coil. 

<table>
<tr><th>Claim 1</th><th>Exemplary Evidence of Infringement by CyrusOne</th></tr>
<tr><td></td><td>https://www.vertiv.com/4afe7d/globalassets/products/thermal-management/room-cooling/liebert-dse-80-165kw-23-43-tons-downflow-system-design-manual.pdf, pp. 3, 6.</td></tr>
<tr><td>[1d] sensing temperatures at one or more locations in said room;</td><td>CyrusOne senses temperatures at one or more locations in said room.

For example, CyrusOne uses Liebert CRAC units and the Liebert CRAC unit control system senses temperatures at the supply sensor, remote sensor, or return sensor locations.

3.1.12 Automatic Fan Speed Control

Temperature sensors can control fan speed using one of three modes based on the type of sensor selected as the fan-control sensor: supply, return, or remote, see Table 3.2 below. Control is based on the selected sensor for both fan control and temperature control and their setpoints as follows:

• Coupled: The fan control and temperature control sensor selection is the same. When coupled, fan speed is determined by the temperature setpoints.
• Decoupled: The fan control and temperature control sensor selection is different. When decoupled, fan speed is determined by the fan setpoints.

Table 3.2 Fan Speed Controlling Sensor Options
<table><tr><th colspan="2" rowspan="2"></th><th colspan="3">Temperature Control Sensor Selected</th></tr><tr><th>Supply Sensor</th><th>Remote Sensor</th><th>Return Sensor</th></tr><tr><td rowspan="3">Fan Control Sensor Selected</td><td>Supply Sensor</td><td>Coupled</td><td>N/A</td><td>N/A</td></tr><tr><td>Remote Sensor</td><td>Decoupled (Recommended)</td><td>Coupled</td><td>N/A</td></tr><tr><td>Return Sensor</td><td>Decoupled</td><td>Decoupled</td><td>Coupled</td></tr></table>
https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 45.</td></tr>
</table>

Claim 1	Exemplary Evidence of Infringement by CyrusOne
[1e] controlling at least one of the temperature of said cooling fluid and said air delivery by said plurality of heat exchanger units to said room in response to said sensed temperatures at said one or more locations; and	CyrusOne controls at least one of the temperature of said cooling fluid and said air delivery by said plurality of heat exchanger units to said room in response to said sensed temperatures at said one or more locations. For example, CyrusOne uses Liebert CRAC units which have temperate sensors that control fan speed in response to sensed temperatures. **3.1.12 Automatic Fan Speed Control** Temperature sensors can control fan speed using one of three modes based on the type of sensor selected as the fan-control sensor: supply, return, or remote, see **Table 3.2** below. Control is based on the selected sensor for both fan control and temperature control and their setpoints as follows: • Coupled: The fan control and temperature control sensor selection is the same. When coupled, fan speed is determined by the temperature setpoints. • Decoupled: The fan control and temperature control sensor selection is different. When decoupled, fan speed is determined by the fan setpoints. **Table 3.2 Fan Speed Controlling Sensor Options** **Temperature Control Sensor Selected** **Supply Sensor** / **Remote Sensor** / **Return Sensor** **Fan Control Sensor Selected** **Supply Sensor**: Coupled; N/A; N/A **Remote Sensor**: Decoupled (Recommended); Coupled; N/A **Return Sensor**: Decoupled; Decoupled; Coupled https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 45. The Liebert cooling unit controls activates the flow of chilled water/glycol, and varies cooling capacity by adjusting a motorized ball valve.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	7.1.4 Temperature Control with a Fluid Economizer When an economizer is installed, the cooling requirement (determined by the temperature proportional band) is addressed first by the economizer's secondary cooling. If the economizer cooling capacity is insufficient, the compressor(s) begin cooling to bring the room air temperature down to the temperature setpoint. The fluid economizer employs a motorized ball valve that controls the flow of chilled water/glycol to provide a cooling capacity from 0% to 100%. https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 110.
[1f] wherein the step of controlling said air delivery by said plurality of heat exchanger units comprises individually manipulating a mass flow rate of the cooling fluid supplied to each of the plurality of heat exchanger units.	CyrusOne controls said air delivery by said plurality of heat exchanger units comprises individually manipulating a mass flow rate of the cooling fluid supplied to each of the plurality of heat exchanger units. For example, CyrusOne uses Liebert CRAC units which have Teamwork mode. Teamwork mode evaluates changes in the air temperature of the inlet, outlet, or supply temperature of the heat dissipating devices and adjusts one or more cooling units controls to provide the required cooling capacity. **6 Teamwork, Standby and Rotation for Cooling Units** U2U communication via private network and additional hardware (see U2U Networking on page 95) allows the following operating features for the cooling units: • Teamwork • Standby (Rotation) • Cascade https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 99.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	6.2.3 Teamwork Mode 1—Parallel Operation In Teamwork mode 1, fan speed and cooling capacity are ramped up in parallel, which means that all units operate identically. Teamwork mode 1 is best for small rooms with balanced heat loads. A master unit collects the controlling readings for temperature and humidity from all the operating (fan on) units in the group, then determines the average or worst-case reading, and sends operating instructions to efficiently distribute cooling capacity across available units. In Teamwork mode 1, most parameters are shared and, when set in any unit, are set in all units in the group. **6.2.4 Teamwork Mode 2—Independent Operation** Teamwork mode 2 works well for most applications, and best in large rooms with un-balanced heat loads by preventing units in a group from operating in opposing modes, some cooling and some heating. All temperature and humidity parameters are shared by the group. The master unit monitors all available unit-sensor readings and determines the demand for cooling, heating, humidification and dehumidification, then sends operating instructions to address the greatest demand. In Teamwork mode 2, the setpoints for all units must be identical. The proportional band, deadband, and related settings may differ by unit. Fan speed is modulated per unit. Rotation and cascading is not available, so expect uneven distribution of work hours. **6.2.5 Teamwork Mode 3—Optimized Aisle Operation** In Teamwork Mode 3, the fan speed for all units operates in parallel, which means fan speed operation is identical at each unit. However, cooling capacity operates independently for each unit. Teamwork mode 3 takes advantage of variable speed fan options and variable capacity component options to maintain rooms with an unbalanced load and to prevent units in a group from operating in opposing modes. All units operate in the same mode based on the average or worst case (maximum) readings from the unit sensors. A local control (cooling capacity supply sensor) provides input to manage and maintain the discharge-air temperature at each unit. In addition, fan speed and operation are controlled based on readings from the unit temperature or static pressure sensors to control air delivery to the cold aisle. https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 102. The Liebert CRAC units also have standby mode. Standby mode evaluates changes in the air temperature of the inlet, outlet, or supply temperature of the heat dissipating devices and actives/de-actives one or more cooling units to provide the required cooling capacity.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	6.3 Assigning Cooling Units to Standby (Lead/Lag) Standby assigns some units to operate while others are on standby, meaning a unit is idle but ready to become active in the event of an alarm condition in one of the operating units or based on a rotation schedule. When a unit is in standby mode, fan(s) are off and no cooling occurs. In multiple cooling unit systems, assigning units to standby lets you: • Configure redundancy in case of failure scenarios (standby). • Manage cooling unit run time (lead/lag). See Setting a Rotation Schedule on the next page . • Modulate for very low loads to full design load (to be temperature reactive) by cascading activation of standby units (configured when setting up teamwork mode). https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 103.

U.S. Patent No. 7,339,490 – Infringement Claim Chart

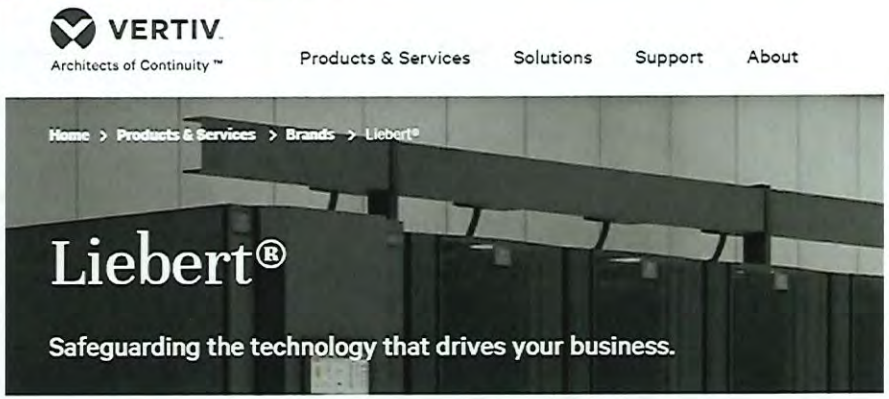
Claim 1	Exemplary Evidence of Infringement by CyrusOne
[1pre] A modular sensor assembly for sensing a condition at a computer rack, comprising:	CyrusOne's data centers use a modular sensor assembly for sensing a condition at a computer rack. For example, CyrusOne uses Vertiv and Liebert cooling in its U.S. data centers to control atmospheric conditions. On information and belief, CyrusOne's Liebert CRAC units are used in conjunction with Liebert's modular sensors, which are used to sense conditions such as temperature, humidity, and door-open status at a computer rack.  https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-CIN97_Cincinnati.pdf, p. 1.

Claim 1	Exemplary Evidence of Infringement by CyrusOne

Cooling

- N+1 Cooling
- Redundant DX and Glycol Chillers
- Redundant raised floor CRAC units
- 12in Raised floor

https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-CIN97_Cincinnati.pdf, p. 2.



https://www.vertiv.com/en-us/products/brands/liebert/

Claim 1	Exemplary Evidence of Infringement by CyrusOne

LIEBERT® SN™
MODULAR SENSORS
Quick Installation Guide

VERTIV.

The Liebert SN modular sensors monitor temperature, humidity, door-open status, and digital input, such as smoke or water, in any area.

These instructions apply to the following Liebert SN modular-sensor models:

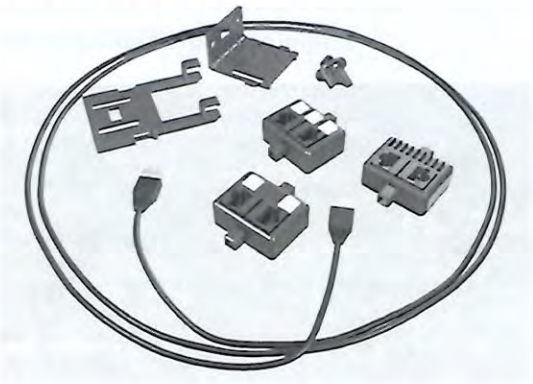
- SN-T—1 temperature probe
- SN-TH—1 temperature probe and 1 humidity probe
- SN-2D—1 door-switch probe with 2 inputs
- SN-3C—1 digital-input probe with 3 inputs

Each modular sensor ships with a 6.6-ft (2-m) cable to connect with a Liebert monitoring product.

SENSOR-STRING COMPATIBLE

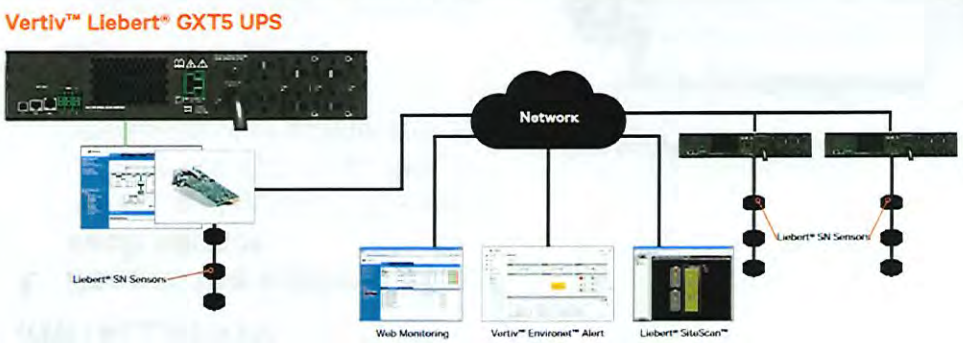
You can attach the sensors in a

Liebert Sensors, Cable and Mount



Claim 1	Exemplary Evidence of Infringement by CyrusOne
	2. Assemble the sensor and bracket If using the supplied bracket and base: • Insert the support base into the end of the support. • Snap the sensor into the other end of the support. **3. Choose a mounting location** Keeping in mind that the temperature and humidity sensors require an unobstructed air flow, and that the sensor does not obstruct vents and impede air flow, select a mounting location. The installation parts needed for various mounting options are included with the sensor. You can install the sensor on rack rails, rack doors, and on a flat surface. **MOUNT THE SENSOR** Use the step appropriate to your chosen mounting method: **4. Mounting on a Knurr® Rack-frame or 19-in. Rail** Insert the quarter-turn, tool-less fastener a slot on the support or base, place the bracket on the frame or rail, and turn the fastener clockwise (1/4 turn) to secure the sensor in place. **5. Mounting on rack door** • On a Knurr rack (only), use the supplied screws through the slots on the support or use the quarter-turn fastener to secure the sensor to the door. • On all other racks (including Knurr), use cable ties to secure the sensor or support bracket to the door. **6. Mounting on a flat surface** Clean the mounting location with the supplied alcohol pad(s), then affix the sensor support to the surface using the supplied Dual Lock fasteners. **7. Mounting on a rack rail** This method requires a standard, pan-head rack screw, not supplied with the sensor. Use the pan-head rack screw through a slot on the sensor support or base to secure the sensor in place. **CONNECT THE SENSOR** The integrated cable connects to the SN Sensor port on your Liebert product. The Liebert SN sensor ports are RJ45 ports designated with the sensor-port icon. **NOTE:** *Only use the SN sensor port to connect Liebert SN sensors.* **CONFIGURE THE SENSOR** Using the sensor address recorded before installation, use the web user interface of your Liebert product to acknowledge the senor connection and configure parameters including labeling the sensor and setting thresholds for alarm/warning triggers. https://www.vertiv.com/49782f/globalassets/shared/liebert-sn-modular-sensors-quick-start-guide_00.pdf
[1a] a) an elongate flexible body, configured to attach to a computer rack;	CyrusOne's modular sensor assemblies comprise an elongate flexible body, configured to attach to a computer rack. CyrusOne uses Liebert CRAC units with Liebert sensors. Liebert modular sensors attached in a strong consist of an elongate flexible body that attaches to a computer rack frame, rail, or door.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	SENSOR-STRING COMPATIBLE You can attach the sensors in a string, and the string can be a combination of integrated and modular sensors. (Integrated sensors are one or more probes integrated on a single cable.) A string may include up to 10 probes and be a maximum of 65.6 ft (20 m). The number of probes that may be used with Liebert monitoring products varies. Refer to the product's user guide for details. https://www.vertiv.com/49782f/globalassets/shared/liebert-sn-modular-sensors-quick-start-guide_00.pdf

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	Vertiv™ Liebert® SN Sensors VERTIV.  https://www.vertiv.com/4a84b9/globalassets/shared/liebert-sn-sensors-monitoring-for-business-critical-continuity2.pdf
[1b] b) a plurality of addressable sensors, disposed along the body and interconnected to a common connector wire; and	CyrusOne's modular sensor assemblies comprise a plurality of addressable sensors, disposed along the body and interconnected to a common connector wire. CyrusOne uses Liebert CRAC units with Liebert sensors. Liebert modular sensors are disposed along the body and interconnected to a common connector wire (string) and are addressable.

SENSOR-STRING COMPATIBLE

You can attach the sensors in a string, and the string can be a combination of integrated and modular sensors. (Integrated sensors are one or more probes integrated on a single cable.)

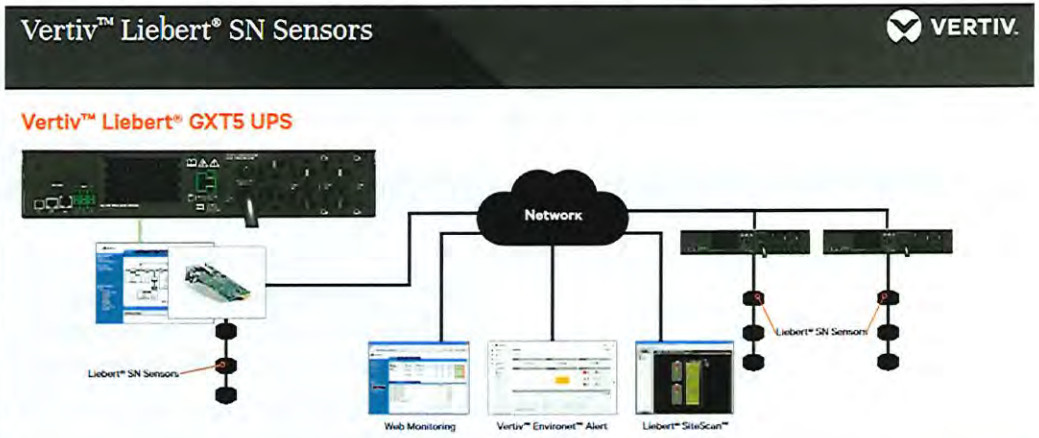
A string may include up to 10 probes and be a maximum of 65.6 ft (20 m).

The number of probes that may be used with Liebert monitoring products varies. Refer to the product's user guide for details.

PREPARING FOR INSTALLATION

1. **Record the address of each sensor.**
   During configuration, the web user interface displays the addresses of all connected sensors.

   Before mounting or connecting, locate the sensor address on the sensor housing (see the picture on the following page) and record it.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	https://www.vertiv.com/49782f/globalassets/shared/liebert-sn-modular-sensors-quick-start-guide_00.pdf
[1c] c) a connector wire lead, configured to interconnect the connector wire to a central system configured to receive and interpret data from the plurality of sensors relating to conditions associated with the computer rack.	CyrusOne's modular sensor assemblies comprise a connector wire lead, configured to interconnect the connector wire to a central system configured to receive and interpret data from the plurality of sensors relating to conditions associated with the computer rack. CyrusOne uses Liebert CRAC units with Liebert sensors. Liebert modular sensors string at each computer rack is interconnected to a central system (network) to receive and interpret the sensors from multiple computer racks. The networked sensor system is configured with thresholds for alarm and warning triggers.  https://www.vertiv.com/4a84b9/globalassets/shared/liebert-sn-sensors-monitoring-for-business-critical-continuity2.pdf

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	CONFIGURE THE SENSOR Using the sensor address recorded before installation, use the web user interface of your Liebert product to acknowledge the senor connection and configure parameters including labeling the sensor and setting thresholds for alarm/warning triggers. https://www.vertiv.com/49782f/globalassets/shared/liebert-sn-modular-sensors-quick-start-guide_00.pdf

U.S. Patent No. 7,031,870 – Infringement Claim Chart

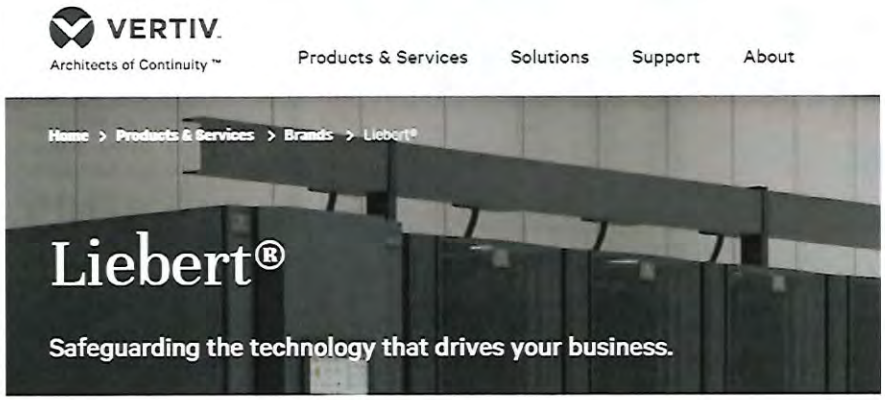
Claim 1	Exemplary Evidence of Infringement by CyrusOne
[1pre] A method for evaluating one or more components in a data center, the method comprising:	CyrusOne's data centers use a method for evaluating one or more components in a data center. For example, CyrusOne uses Vertiv and Liebert cooling in its U.S. data centers to control atmospheric conditions. Liebert's CRAC units are controlled, for example, by Liebert's iCOM and/or iCOM-S Intelligent Communication and Monitoring System, which uses a method for evaluating one or more components in a data center.  https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-CIN97_Cincinnati.pdf, p. 1.

Claim 1	Exemplary Evidence of Infringement by CyrusOne

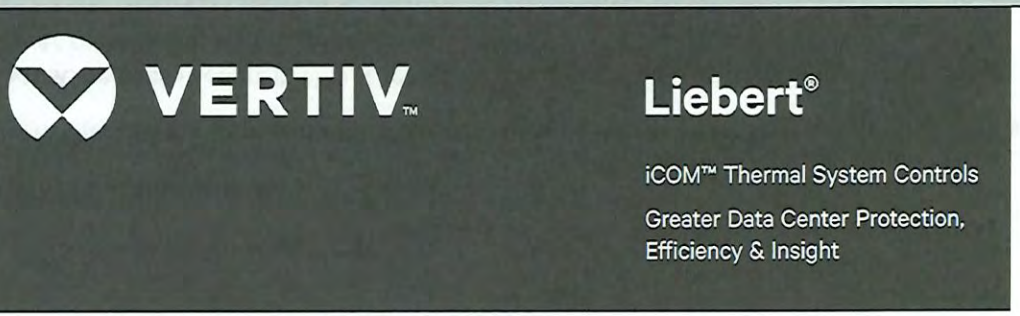
Cooling

- N+1 Cooling
- Redundant DX and Glycol Chillers
- Redundant raised floor CRAC units
- 12in Raised floor

https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-CIN97_Cincinnati.pdf, p. 2.



https://www.vertiv.com/en-us/products/brands/liebert/

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	 https://www.vertiv.com/49d637/globalassets/shared/liebert-icom-thermal-system-controls-brochure.pdf ("iCOM Brochure").

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	At the cooling unit level, the Liebert iCOM unit control provides the highest protection available and optimal performance • Monitors 380 unit and component points to eliminate single points of failure • Self-healing features avoid passing unsafe operating thresholds • Highly intuitive, full-color, touch screen simplifies operations to save time and reduce human error • Multiple, automated unit protection routines, including lead/lag, cascade, rapid restart, refrigerant protection and valve calibration  **At the supervisory level,** the Liebert iCOM-S system control offers a revolutionary way to harmonize and optimize thermal system performance to optimize capacity across the data center, gain quick access to actionable data, and automate system diagnostics and trending. • Advanced monitoring and at-a-glance reporting on performance metrics and trends for efficiency, capacity and adverse events • Up to 50% system efficiency gains • 30% lower deployment costs • Teamwork modes that prevent conflict between units and allow them to adapt to changes in facility and IT demand to improve efficiency and availability and reduce system wear and tear – saving more than $10,000 per unit per year in energy costs • Simple and easy to deploy — auto-configuration to detect and configure up to 4,800 sensors, eliminating the need for custom integration to building management systems and cutting sensor deployment times in half  Liebert iCOM unit control and Liebert iCOM-S system control are available for new Vertiv™ data center cooling units or as retrofits. iCOM Brochure at p. 3.
[1a] detecting inlet and outlet temperatures of one or more heat dissipating devices;	CyrusOne detects inlet and outlet temperatures of one or more heat dissipating devices. CyrusOne uses Liebert iCOM. Liebert iCOM detects inlet and outlet temperatures at server racks using wired, remote rack sensors.

Claim 1	Exemplary Evidence of Infringement by CyrusOne
	9.4 Wired Remote Sensors Wired, remote, rack sensors can function as control sensors and subsequently, provide input individually at the unit level or at the system level for temperature control and teamwork functions. Each wired remote rack sensor has two thermistors/probes. In Individual Sensor mode, the higher temperature reading or the average temperature reading of the two probes can be used. In Unit Sensors mode, some or all of the rack sensor's temperature readings are considered for higher (maximum) or average calculation. For example, setting three sensors as control and average for unit mode, averages the three highest temperature readings. https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf ("iCOM Manual") at p. 156.
[1b] detecting temperatures of air supplied by one or more computer room air conditioning (CRAC) units;	CyrusOne detects temperatures of air supplied by one or more computer room air conditioning (CRAC) units. CyrusOne uses Liebert iCOM. Liebert iCOM detects temperatures of air supplied by one or more CRAC units. **13.4 Installing Supply Control Sensors** **13.4.1 Installing the Supply Air Temperature Sensor** The supply temperature sensor is connected to P8, Pins 1 and 2 at the factory and requires no configuration. 1. Place the sensor in an area that is influenced only by the unit to which it is connected to provide an accurate reading: 5 ft. to 15 ft. (1.5 m to 4.5 m) from the cooling unit, **Figure 13.16** below. iCOM Manual at p. 191.
[1c] calculating indices of air re-circulation for the one or more heat dissipating devices based upon the detected inlet temperatures, outlet temperatures and supplied air temperatures;	CyrusOne calculates indices of air re-circulation for the one or more heat dissipating devices based upon the detected inlet temperatures, outlet temperatures and supplied air temperatures. CyrusOne uses Liebert iCOM. Liebert iCOM calculates indices of air recirculation for server racks based on detected inlet, outlet, and supplied air temperatures.

Claim 1	Exemplary Evidence of Infringement by CyrusOne

13.2 Installing Wired Remote Sensors

Up to 10 remote sensor modules, installed in the monitored racks and connected to the cooling unit, provide control and reference input to iCOM and building-management systems. Using remote, rack sensors combats cooling problems related to recirculation air, uneven rack loading, and air distribution

iCOM Manual at p. 180.

13.1 Return Air Temperature/Humidity Sensor

The return temperature/humidity sensor is located in the unit return air section and is supplied on all Liebert®systems with iCOM™ controls. The assembly connects to plug connection P67 on the iCOM internal control board on all CRV systems.

iCOM Manual at p. 179.

13.4 Installing Supply Control Sensors

13.4.1 Installing the Supply Air Temperature Sensor

The supply temperature sensor is connected to P8, Pins 1 and 2 at the factory and requires no configuration.

1. Place the sensor in an area that is influenced only by the unit to which it is connected to provide an accurate reading: 5 ft. to 15 ft. (1.5 m to 4.5 m) from the cooling unit, **Figure 13.16** below.

iCOM Manual at p. 191.

Temperature Control Sensor

Selects sensor that controls cooling. Values are:

- Supply Sensor: Temperature control is based on maintaining the temperature of the discharge air from the cooling unit. See Supply Sensors on page 158.
- Remote Sensor: Temperature control is based on the temperature reading(s) from wired remote/rack sensor(s). See Wired Remote Sensors on page 156.
- Return Sensor: Temperature control is based on maintaining the temperature of the room air.
- Customer input setpoint (remote alarm device)

<table>
<tr><th>Claim 1</th><th>Exemplary Evidence of Infringement by CyrusOne</th></tr>
<tr><td></td><td>iCOM Manual at p. 25.</td></tr>
<tr><td>[1d] varying a flow field setting of air delivered to the one or more heat dissipating devices;</td><td>CyrusOne varies a flow field setting of air delivered to the one or more heat dissipating devices.

CyrusOne uses Liebert iCOM. Liebert iCOM varies the flow field setting of air delivered to server racks by, for example, controlling fan speed.

3.1.12 Automatic Fan Speed Control

Temperature sensors can control fan speed using one of three modes based on the type of sensor selected as the fan-control sensor: supply, return, or remote, see Table 3.2 below. Control is based on the selected sensor for both fan control and temperature control and their setpoints as follows:

• Coupled: The fan control and temperature control sensor selection is the same. When coupled, fan speed is determined by the temperature setpoints.
• Decoupled: The fan control and temperature control sensor selection is different. When decoupled, fan speed is determined by the fan setpoints.

Table 3.2 Fan Speed Controlling Sensor Options
<table><tr><th colspan="2" rowspan="2"></th><th colspan="3">Temperature Control Sensor Selected</th></tr><tr><th>Supply Sensor</th><th>Remote Sensor</th><th>Return Sensor</th></tr><tr><td rowspan="3">Fan Control Sensor Selected</td><td>Supply Sensor</td><td>Coupled</td><td>N/A</td><td>N/A</td></tr><tr><td>Remote Sensor</td><td>Decoupled (Recommended)</td><td>Coupled</td><td>N/A</td></tr><tr><td>Return Sensor</td><td>Decoupled</td><td>Decoupled</td><td>Coupled</td></tr></table>
iCOM Manual at p. 45.</td></tr>
<tr><td>[1e] determining whether the indices of air re-circulation has changed in response to the varied flow field settings; and</td><td>CyrusOne determines whether the indices of air re-circulation has changed in response to the varied flow field settings.

CyrusOne uses Liebert iCOM. Liebert iCOM determines whether the indices of air re-circulation have changed in response to varied flow field settings, by for example</td></tr>
</table>

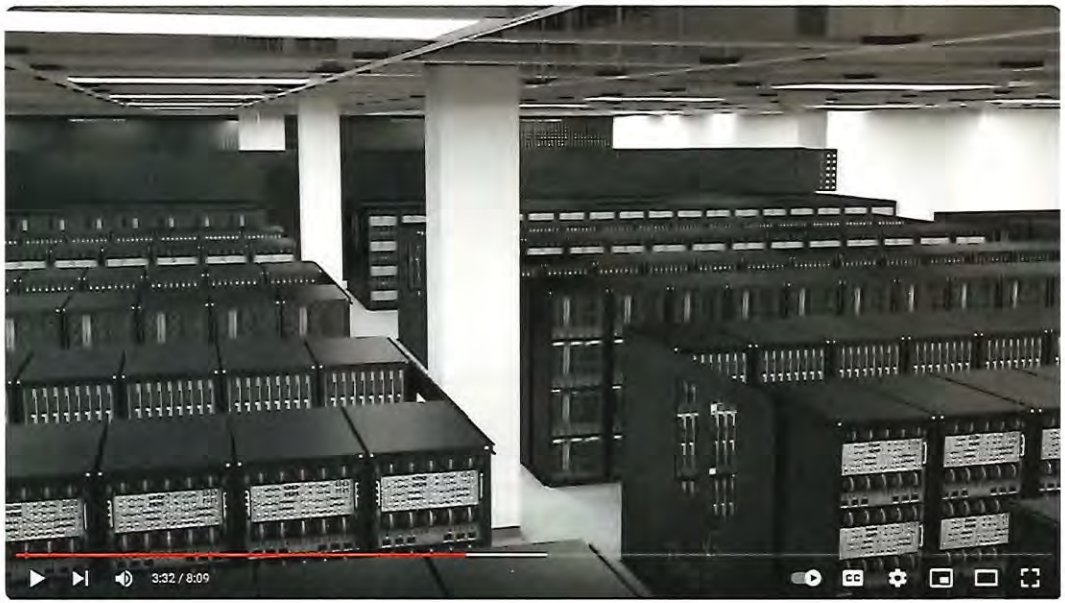
Claim 1	Exemplary Evidence of Infringement by CyrusOne
	changing the response to varying fan speeds based on the length of time temperature has deviated and the amount of deviation from the setpoint. **Temperature Integration Time** Adjusts amount of cooling/heating based on the length of time the temperature has deviated from the setpoint. The time selected is the amount of time it will take cooling capacity to reach 100%. For example, if three minutes is selected, cooling capacity will increase to 100% in three minutes. NOTE: Three to five minutes of integration time is adequate for most applications. See Considerations when Using PI Temperature Control on page 28 . NOTE: Only used when Temperature Control Type is PI. **Temperature Proportional Band** Adjusts the activation point of cooling/heating components based on deviation from setpoint by placing half of the selected value on each side of the temperature control setpoint. A smaller number causes faster reaction to temperature changes. NOTE: Setting this too low causes short cycling of compressors. iCOM Manual at p. 25.
[1f] evaluating the one or more components based upon changes in the indices of air re-circulation for the one or more heat dissipating devices at the various flow field settings.	CyrusOne evaluates the one or more components based upon changes in the indices of air re-circulation for the one or more heat dissipating devices at the various flow field settings. CyrusOne uses Liebert iCOM. Liebert iCOM evaluates the components based on changed in the indices of air re-circulation for the server racks at various flow field settings. For example, Teamwork Mode evaluates changes in the air temperature of the inlet, outlet, or supply temperature of the heat dissipating devices and adjusts one or more cooling units controls to provide the required cooling capacity, and Standby Mode evaluates these changes and activates/deactivates one or more CRAC units to provide required cooling capacity.

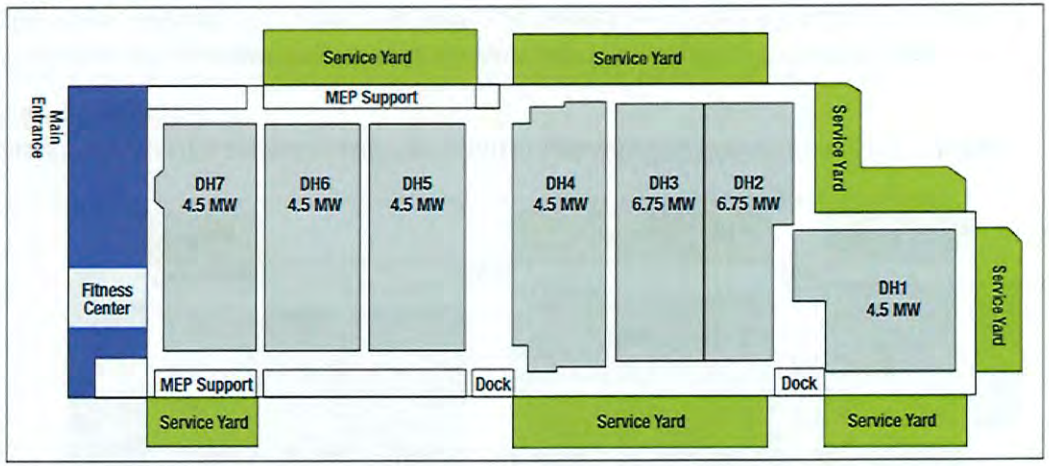
Claim 1	Exemplary Evidence of Infringement by CyrusOne
	6 Teamwork, Standby and Rotation for Cooling Units U2U communication via private network and additional hardware (see U2U Networking on page 95) allows the following operating features for the cooling units: • Teamwork • Standby (Rotation) • Cascade iCOM Manual at p. 99.

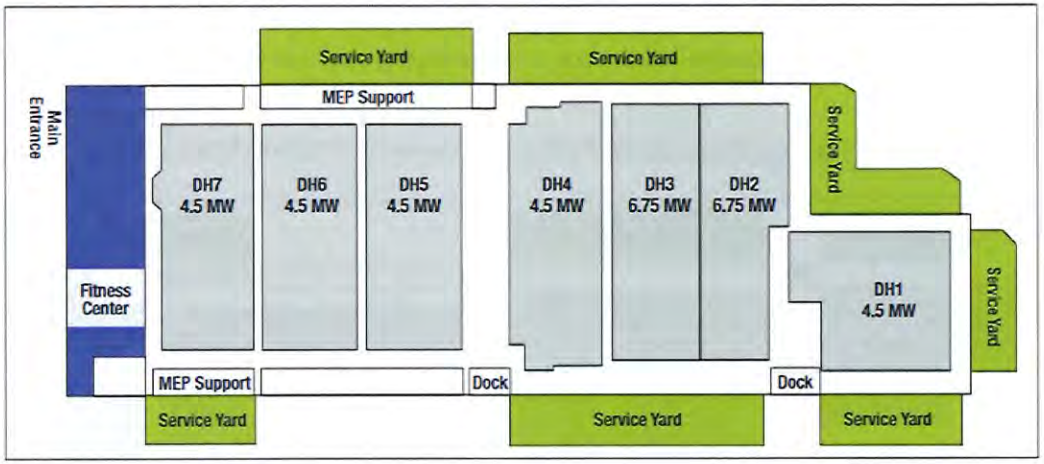
Claim 1	Exemplary Evidence of Infringement by CyrusOne
	6.2.3 Teamwork Mode 1—Parallel Operation In Teamwork mode 1, fan speed and cooling capacity are ramped up in parallel, which means that all units operate identically. Teamwork mode 1 is best for small rooms with balanced heat loads. A master unit collects the controlling readings for temperature and humidity from all the operating (fan on) units in the group, then determines the average or worst-case reading, and sends operating instructions to efficiently distribute cooling capacity across available units. In Teamwork mode 1, most parameters are shared and, when set in any unit, are set in all units in the group. **6.2.4 Teamwork Mode 2—Independent Operation** Teamwork mode 2 works well for most applications, and best in large rooms with un-balanced heat loads by preventing units in a group from operating in opposing modes, some cooling and some heating. All temperature and humidity parameters are shared by the group. The master unit monitors all available unit-sensor readings and determines the demand for cooling, heating, humidification and dehumidification, then sends operating instructions to address the greatest demand. In Teamwork mode 2, the setpoints for all units must be identical. The proportional band, deadband, and related settings may differ by unit. Fan speed is modulated per unit. Rotation and cascading is not available, so expect uneven distribution of work hours. **6.2.5 Teamwork Mode 3—Optimized Aisle Operation** In Teamwork Mode 3, the fan speed for all units operates in parallel, which means fan speed operation is identical at each unit. However, cooling capacity operates independently for each unit. Teamwork mode 3 takes advantage of variable speed fan options and variable capacity component options to maintain rooms with an unbalanced load and to prevent units in a group from operating in opposing modes. All units operate in the same mode based on the average or worst case (maximum) readings from the unit sensors. A local control (cooling capacity supply sensor) provides input to manage and maintain the discharge-air temperature at each unit. In addition, fan speed and operation are controlled based on readings from the unit temperature or static pressure sensors to control air delivery to the cold aisle. iCOM Manual at p. 102.

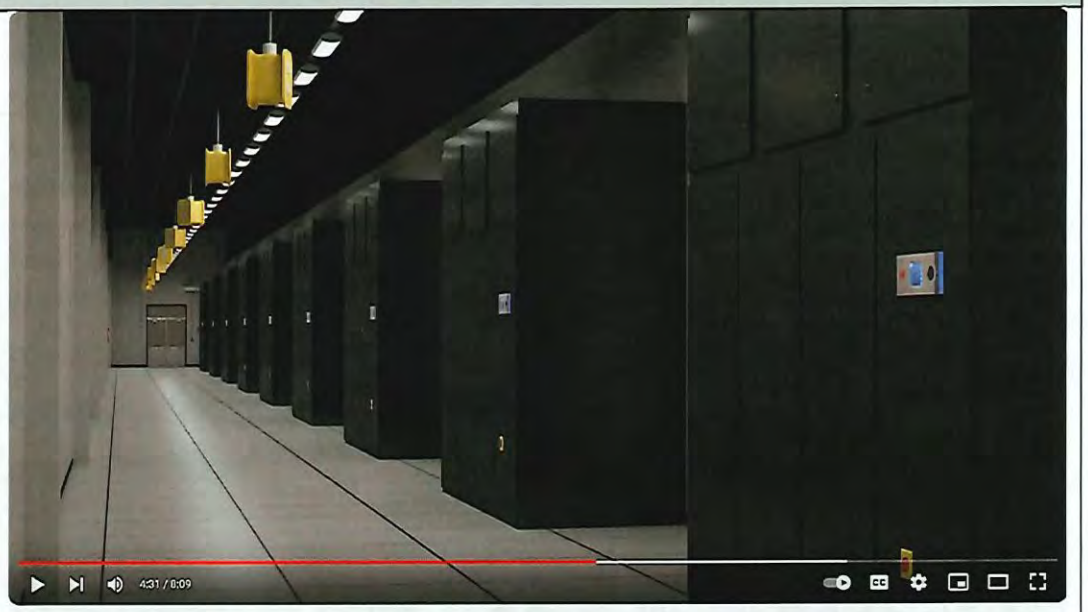
Claim 1	Exemplary Evidence of Infringement by CyrusOne
	6.3 Assigning Cooling Units to Standby (Lead/Lag) Standby assigns some units to operate while others are on standby, meaning a unit is idle but ready to become active in the event of an alarm condition in one of the operating units or based on a rotation schedule. When a unit is in standby mode, fan(s) are off and no cooling occurs. In multiple cooling unit systems, assigning units to standby lets you: • Configure redundancy in case of failure scenarios (standby). • Manage cooling unit run time (lead/lag). See Setting a Rotation Schedule on the next page . • Modulate for very low loads to full design load (to be temperature reactive) by cascading activation of standby units (configured when setting up teamwork mode). iCOM Manual at p. 103.

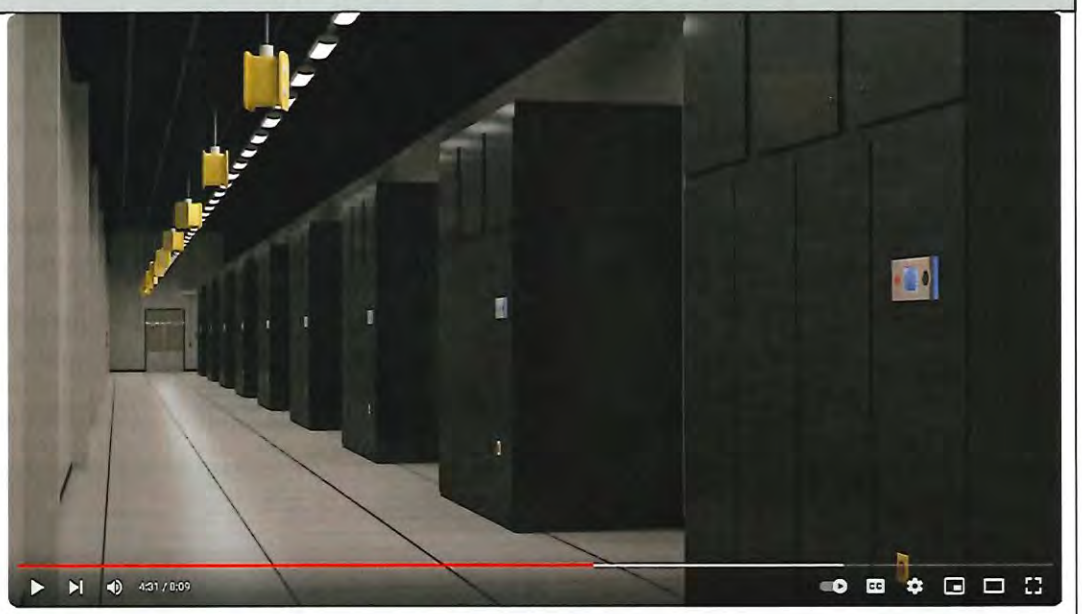
U.S. Patent No. 9,310,855 – Infringement Claim Chart

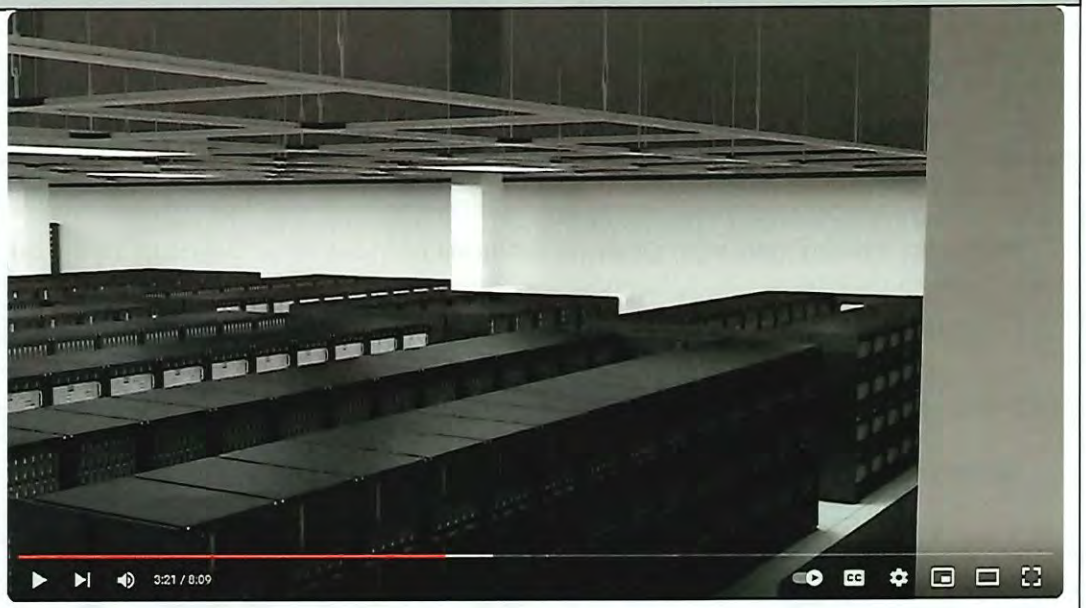
Claim Language	Exemplary Evidence of Infringement by CyrusOne
[8pre] A flexible data center including T rows of server racks, comprising:	CyrusOne uses flexible data centers including T rows of server racks comprising the elements below. For example, the virtual tour of CyrusOne DFW1 illustrates a portion of the total T rows of server racks.  https://www.youtube.com/watch?v=FjtRE8xy-tY at 3:32 minute mark. "Designed with CyrusOne's unique massively modular concept, including single purpose built dedicated facilities as well as shared infrastructure solutions, this data center enables customers to quickly scale their data center environment based on their changing IT demands."

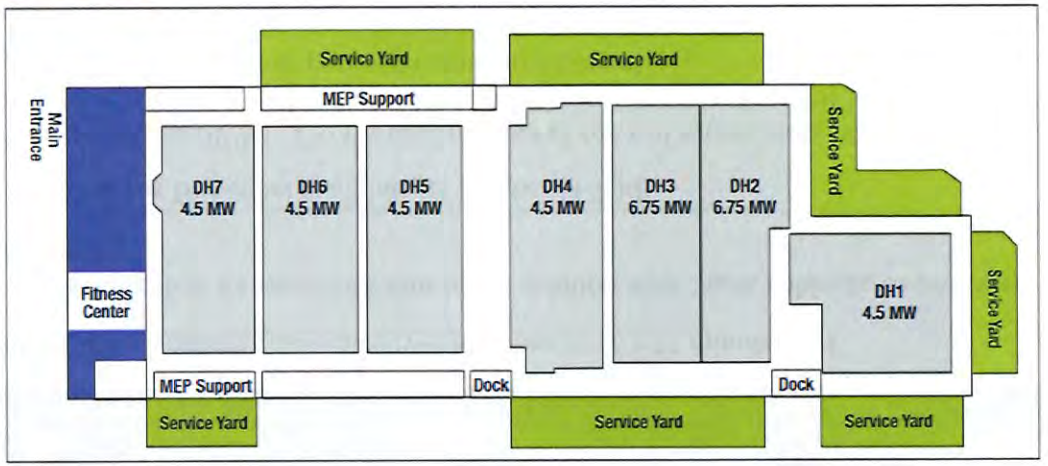
Claim Language	Exemplary Evidence of Infringement by CyrusOne
	Id. at 1:19-1:35.
[8a] a number B of blocks on a site, each block including:	CyrusOne has a number B of blocks on a site. For example, the DFW1 spec sheet illustrates B number of blocks on the site including DH1, DH2/3/4, and DH5/6/7. **Site Plan**  https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-DFW1_Dallas-Carrollton.pdf
[8b] one to a number P of perimeter structures, wherein each perimeter structure houses up to a number R of rows of server racks; and	CyrusOne has one to a number P of perimeter structures, wherein each perimeter structure houses up to a number R of rows of server racks. For example, the DFW1 spec sheet shows P number of perimeter structures (DH1-7) which houses up to R rows of server racks.

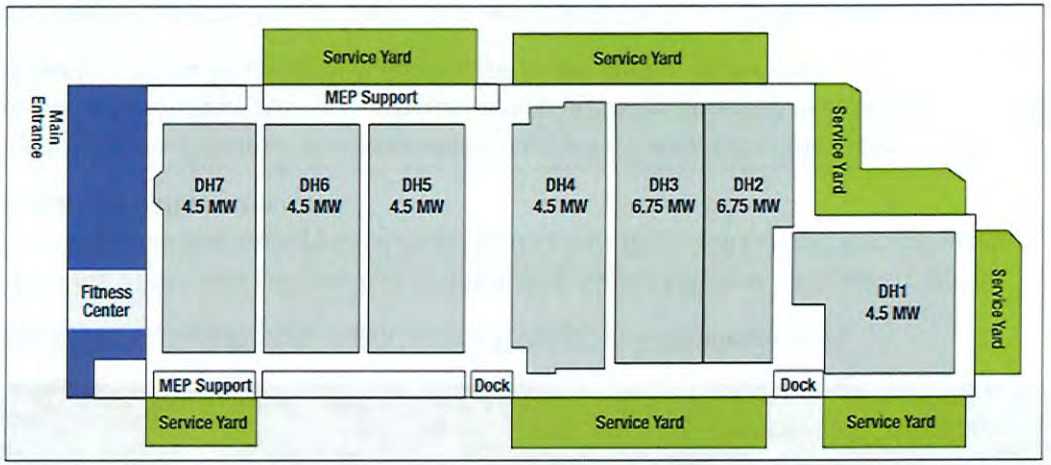
Claim Language	Exemplary Evidence of Infringement by CyrusOne
	Site Plan  https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-DFW1_Dallas-Carrollton.pdf
[8c] a connecting structure connected to the number P of perimeter structures, wherein the connecting structure houses operations monitoring equipment for the server racks, and wherein the one to the number P of perimeter structures retain functionality independent of the connecting structure;	CyrusOne has a connecting structure connected to the number P of perimeter structures, wherein the connecting structure houses operations monitoring equipment for the server racks, and wherein the one to the number P of perimeter structures retain functionality independent of the connecting structure. For example, CyrusOne videos show the CRAH units are located in a connecting structure adjacent to the P perimeter structures. The connecting structure houses the CRAH cooling units and sensors that monitor environmental operating conditions for the server racks.

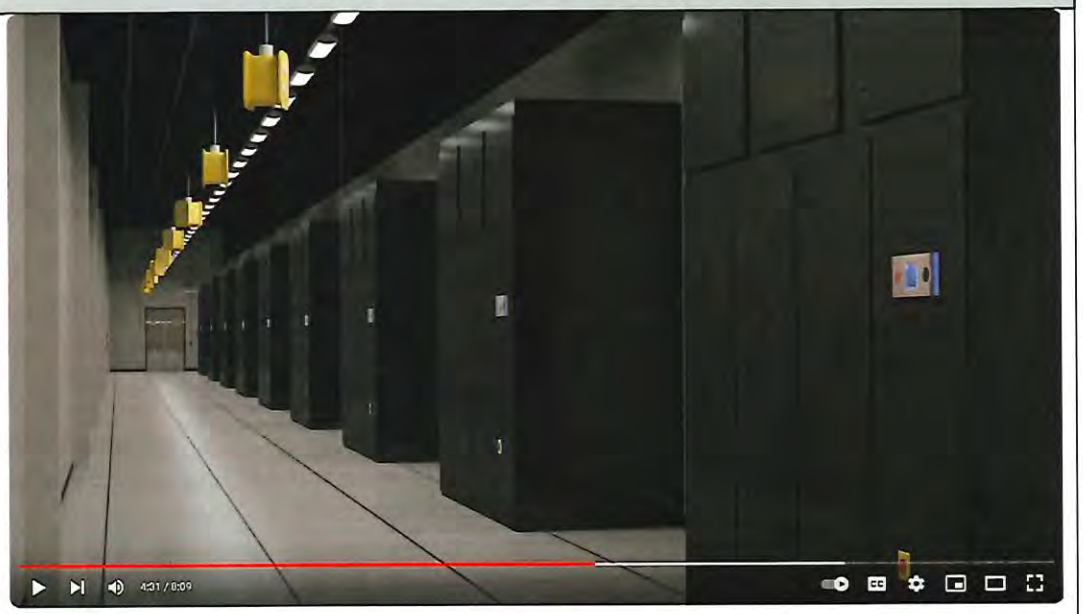
Claim Language	Exemplary Evidence of Infringement by CyrusOne
	 https://www.youtube.com/watch?v=FjtRE8xy-tY at 4:20 minute mark "Cooling of the data hall space is performed by highly efficient computer room air handling units that are separated from the data hall floor."
[8d] a total integer number T/R of perimeter structures comprising the number P of perimeter structures, wherein:	CyrusOne has a total integer number T/R of perimeter structures comprising the number P of perimeter structures. For example, the virtual tour of CyrusOne DFW1 illustrates a portion of the R rows of server racks within a perimeter structure P.

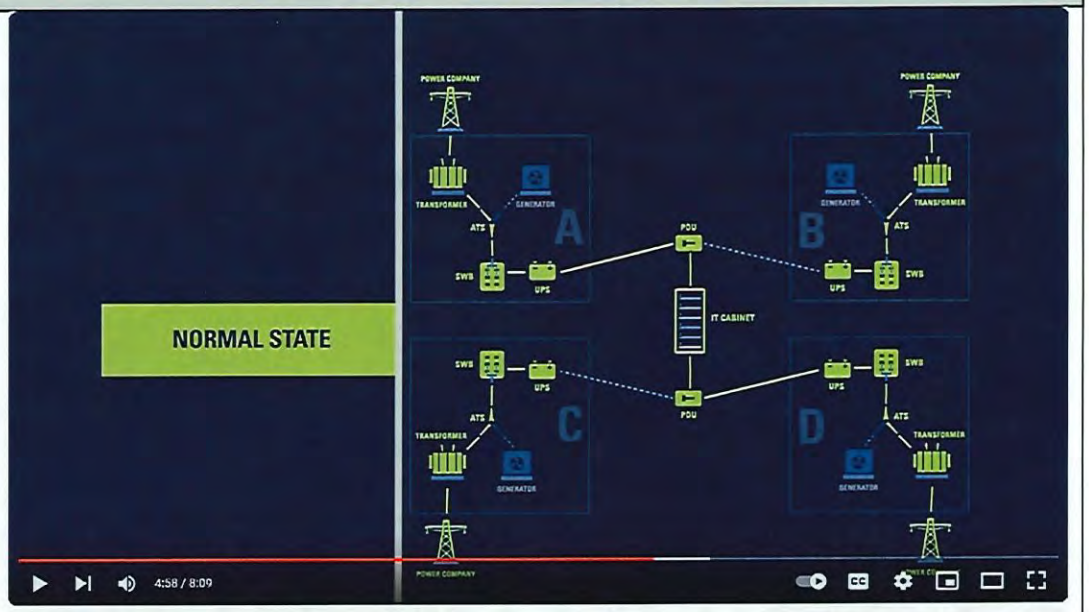
Claim Language	Exemplary Evidence of Infringement by CyrusOne
	 https://www.youtube.com/watch?v=FjtRE8xy-tY at 3:32 minute mark
[8e] at most one perimeter structure houses less than R rows of server racks;	CyrusOne has at most one perimeter structure houses less than R rows of server racks. For example, in order to provide a customized solution of cages or cabinets with a P perimeter structure, the initial number of cabinets within a P perimeter structure will be less than R (the maximum number of cabinet within a P perimeter structure). If customers within the P perimeter structure select cage space, there will be less room for total number of cabinets that can fit within the space.

Claim Language	Exemplary Evidence of Infringement by CyrusOne
	 https://www.youtube.com/watch?v=FjtRE8xy-tY at 3:21 minute mark. "CyrusOne offers a customized data center solution with cages, cabinets, or dedicated data hall."
[8f] B is equal to an integer number (T/R)/P; and	CyrusOne has B is equal to an integer number (T/R)/P. For example, in DFW1, T is the total number of rows of server racks, R is the number of rows of server racks that are within a P perimeter structure (each of DH1 through DH7). P is the number of perimeter structures (seven).

Claim Language	Exemplary Evidence of Infringement by CyrusOne
	Site Plan  https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-DFW1_Dallas-Carrollton.pdf
[8g] at most one block includes less than P perimeter structures;	CyrusOne has at most one block includes less than P perimeter structures. For example, initial build would require a block to built with less than P perimeter structures. (e.g., DH2/DH3/DH4 block would be initially built with one or two P perimeter structures, with the third perimeter structure to be built out at a later time).

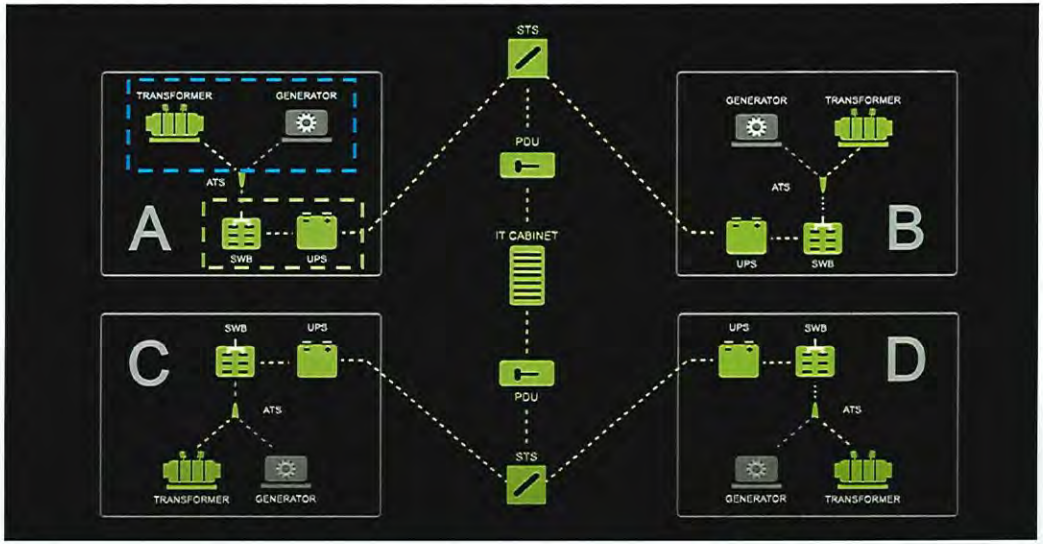
Claim Language	Exemplary Evidence of Infringement by CyrusOne
	Site Plan  https://documents.cyrusone.com/wp-content/uploads/2023/06/2022-DFW1_Dallas-Carrollton.pdf
[8h] a number of cooling units connected to an exterior of a respective perimeter structure, wherein a type of the number of cooling units is particular to a climate of the site; and	CyrusOne has a number of cooling units connected to an exterior of a respective perimeter structure, wherein a type of the number of cooling units is particular to a climate of the site. For example, CyrusOne's virtual tour shows the CRAH units are located in a connecting structure adjacent to the P perimeter structures. The connecting structure houses the CRAH cooling units and sensors that monitor environmental operating conditions for the server racks.

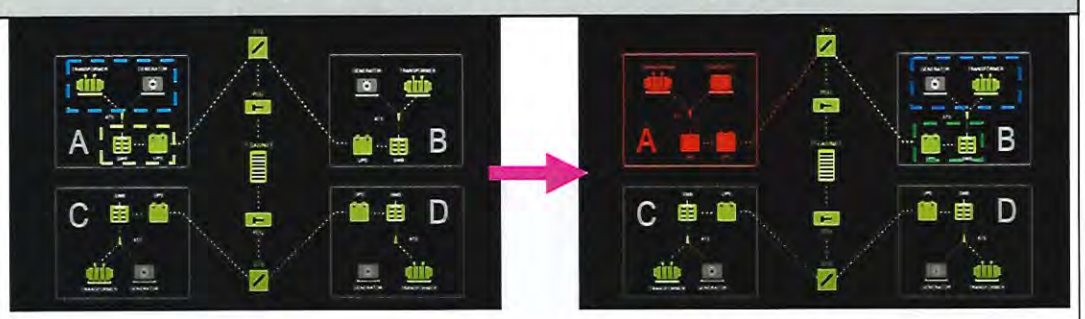
Claim Language	Exemplary Evidence of Infringement by CyrusOne
	 https://www.youtube.com/watch?v=FjtRE8xy-tY at 4:20 minute mark "Cooling of the data hall space is performed by highly efficient computer room air handling units that are separated from the data hall floor. This allows for optimization of the data hall environment."
[8i] a number of power conditioner units connected to the exterior of the respective perimeter structure, wherein a type of the number of power conditioner units is particular to a desired power quality and to the climate of the site.	CyrusOne has a number of power conditioner units connected to the exterior of the respective perimeter structure, wherein a type of the number of power conditioner units is particular to a desired power quality and to the climate of the site. For example, CyrusOne's virtual tours show the following information about power conditioner units.

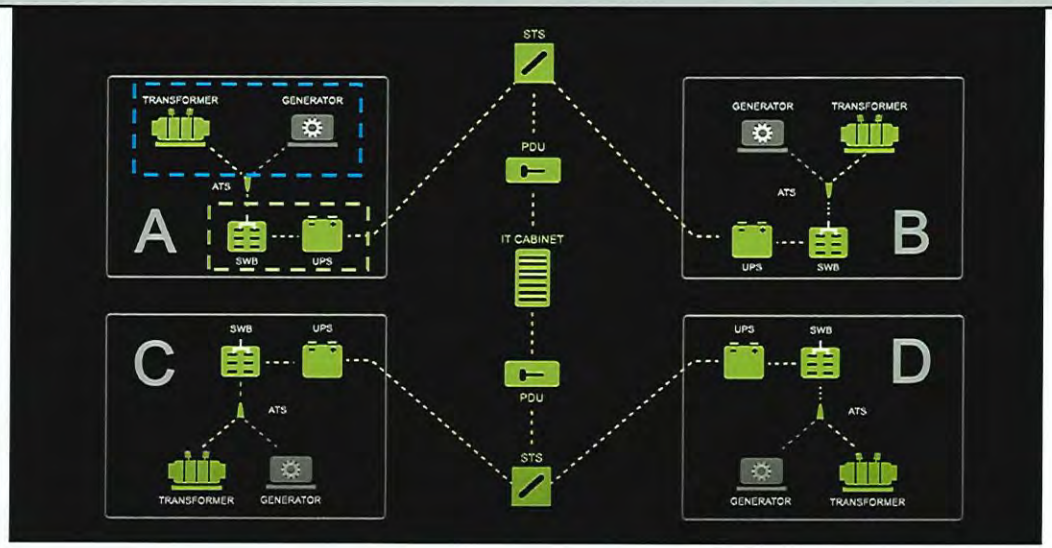
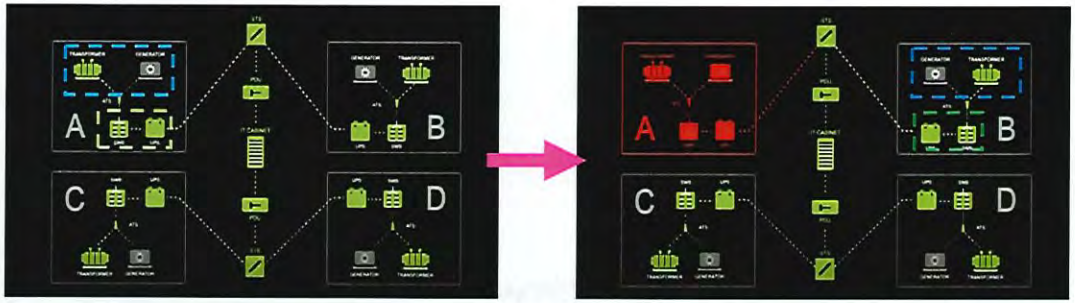
Claim Language	Exemplary Evidence of Infringement by CyrusOne
	 https://www.youtube.com/watch?v=FjtRE8xy-tY at 3:28 to 3:45, 4:58 minute mark "The distributed redundant power design is a meshed power system guaranteed to ensure maximum uptime." "Each data hall is designed for fully redundant power availability. The distributed redundant electrical design enables multiple levels of redundancy within the same data hall. Therefore, customers can choose their level of redundancy, either 2N, N+1 or N."

U.S. Patent No. 7,939,967 – Infringement Claim Chart

Claim Language	Exemplary Evidence of Infringement by CyrusOne
[1pre] An apparatus, comprising:	CyrusOne operates data centers with power redundancy by connecting equipment to redundant power supplies.  "Of course, all of our chillers are on a redundant block system, meaning in the event of their failure or a power failure your equipment will continue to operate smoothly without interruption. With CyrusOne you have the peace of mind that your equipment is always operational."

Claim Language	Exemplary Evidence of Infringement by CyrusOne
	https://www.youtube.com/watch?app=desktop&v=jDKq617iWKo
[1a] a first power supply coupled to an electrical load and a first source of electrical energy, the first power supply configured to issue an alert signal indicative of a failure condition of the first source of electrical energy; and	CyrusOne data centers include a first power supply coupled to an electrical load and a first source of electrical energy, the first power supply configured to issue an alert signal indicative of a failure condition of the first source of electrical energy. For example, CyrusOne data centers offer power redundancy by connecting equipment to a redundant block system – sharing the electrical load over two power supplies with respective electrical power sources.  https://www.youtube.com/watch?app=desktop&v=jDKq617iWKo @1m42s. A first power supply of the will issue an alert if its electrical power source fails, this will signal the second power supply to transition from sharing to handing the full load – eliminating any potential downtime.

Claim Language	Exemplary Evidence of Infringement by CyrusOne
	 https://www.youtube.com/watch?app=desktop&v=jDKq617iWKo @ 1m41s and 1m46s.
[1b] a second power supply coupled to the electrical load and a second source of electrical energy, the second power supply configured to transition from a lesser output level to a greater output level in response to an activation signal.	CyrusOne data centers have a second power supply coupled to the electrical load and a second source of electrical energy, the second power supply configured to transition from a lesser output level to a greater output level in response to an activation signal. For example, CyrusOne data centers offer power redundancy by connecting equipment to a redundant block system – sharing the electrical load over two power supplies with respective electrical power sources.

Claim Language	Exemplary Evidence of Infringement by CyrusOne
	 https://www.youtube.com/watch?app=desktop&v=jDKq617iWKo @1m42s. A first power supply of the will issue an alert if its electrical power source fails, this will signal the second power supply to transition from sharing to handing the full load – eliminating any potential downtime. 

Claim Language	Exemplary Evidence of Infringement by CyrusOne
	https://www.youtube.com/watch?app=desktop&v=jDKq617iWKo @ 1m41s and 1m46s.

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